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ABSTRACT

This manual provides a comprehensive approach to problem solving; it is written in narrative style with numerous examples. The guide is organized in eight sections that cover the following topics: (1) problem-solving overview (with suggested readings and recommendations for schools); (2) a five-step model for solving problems; (3) strategies for solving problems--general guidelines (with guidelines from deBono and Whimbey and Lochhead); (4) specific problem-solving strategies (such as thinking aloud, trial and error, working backwards, finding all the possibilities, time management, logical and critical reasoning) with sample problems for each strategy; (5) the five-step model extended for problem solving; (6) higher order problem-solving skills; (7) interpersonal skills for being effective with individuals and in groups; and (8) problem solving in groups. A 95-page appendix covers facilitative communication in teaching situations, giving numerous examples and sample problems to solve. References are included in the guide. (KC)

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Strategies for
Problem Solving

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PROBLEM SOLVING

The importance of problem solving in vocational education is receiving more national attention now than ever before. For example, Daniels and Karmos (1983) found that except for the three R's, problem solving was listed most frequently in the literature and by employers as an essential skill for dealing with the future. Michael Timpane, in his report of corporations and public education, emphasized the need for teaching young people problem solving skills so they will be ready for further education and training (Timpane, 1982).

Roy Forbes, Director of the assessment and evaluation division of the Education Commission of the states, predicted that by 1990 between 900,000 and 2,000,000 high school graduates will not possess the problem solving skills required for employment in a highly technological society (Whimbey & Lochhead, 1984). Pratzner (1984) has stated that "The first priority is for secondary level vocational education to offer good education in reading, writing, computing, listening, and problem solving" (p. 6). Lemons (1984) concluded that the education required to prepare individuals for post-secondary education and training for high-technology occupations must include critical thinking and reasoning skills (p. xii).

Not enough problem solving is occurring in classrooms. In the April, 1983 Kappan, John Goodlad remarked that "teacher talk" was by far the dominant classroom activity. "Teachers rarely encouraged student-to-student dialogue or provided opportunities for students to work collaboratively in small groups or to plan, set goals, determine alternative ways of achieving these goals, and the like. The emphasis was on

recall, not on problem solving or inquiry" (p. 552). Goodlad went on to say that each of the 50 states believes in problem-solving instruction but very few are doing much with it.

Ann Brown from the University of Illinois conducted an interview with Edward Binet (Brown, 1984) on the teaching of problem solving skills. Binet said:

> What I object to in traditional classes is that it is the teacher who produces, and the student who passively listens. Such a lesson has two faults: It does not impress the student other than by its verbal function, it gives him words instead of making him deal with actual objects, and it appeals only to his memory, reducing him to a passive state. He doesn't judge, doesn't think, doesn't invent, and doesn't produce. He needs only to retain. His aim is to repeat without mistake, make his memory work, know what is in the lecture, in the textbook and reproduce it. The results of such practices are deplorable: E.g., a lack of curiosity for what is not in the book or lecture; a tendency to look for the truth only in the book, the belief that one is doing some original research by going through a book, too much respect for the writer's opinion, a lack of interest in the world and the lessons it gives, a naive belief in the power of simple formulas, a difficulty to adapt oneself to contemporary life, and above all, a static regimentation unwelcome at a period when social evolution is so fast. (pp. 14-15)

Something is being done about problem solving by business and industry. In 1983, General Motors trained approximately 50 percent of its employees in problem solving skills. Kathy Long, Director of Research and Development for GM, said in a personal interview (1983) that the training has been successful, that productivity and positive attitudes have both increased, and that General Motors is going to devote more time and money to problem solving training. The training has improved worker competency, enabled workers to diagnose and solve job-related problems, taught them to examine their own behavior and consequences of it, and has helped workers to be more cooperative with each other in solving problems (Guest, 1979). The Center for Public Resources, in its report Basic Skills in the United States Work Force (1982), identified other corporations and also schools which are currently involved in problem solving training.

Suggested Readings--Recommendations for Schools

National Council of Teachers of Mathematics. (1980). An agenda for action. Reston, VA: National Council of Teachers of Mathematics.

Includes an argument that problem solving be the focus of school mathematics in the 80's. "The higher-order mental processes of logical reasoning, information processing, and decision making should be considered basic to the application of mathematics."

The National Council of Teachers of English. (1982). Essentials of English. Urbana, IL: The National Council of Teachers of English.

The Council holds that one of the main duties of English teachers is to teach students how to think. "Thinking skills, involved in the study of all disciplines, are inherent in the reading, writing, speaking, listening and observing involved in the study of English. . . .The capacity to solve problems, both rationally and intuitively is a way to help students cope successfully with the experience of learning within the school setting and outside."

Kurfman, D., & Cassidy, E. (1977). Developing decision-making skills. Arlington, VA: The National Council for the Social Studies.

The authors state that knowledge attainment, as important as it is, "is not a sufficiently broad purpose to guide program development

or to inspire modern students." They propose: "learning only easily testable fact-finding skills will prove increasingly inadequate for life in the modern world. Much more than fact-finding skills--that is, higher-level thought processes, useful knowledge, and clear values--are needed for students to function effectively."

Goodlad, J. (1983, March). A study of schooling: Some findings and hypotheses. Phi Delta Kappan, 465-470.

Goodlad's study of over 1,000 classrooms across the country demonstrated that most of the instruction focused on information recall and that very little was going on in classrooms to encourage problem solving or thinking skills.

A MODEL FOR PROBLEM SOLVING

For students to hold jobs, to be retrained and in general to adapt to a constantly accelerating rate of change in their lives, they will need strategies for how to attack and solve problems. Possession of at least one general model for solving problems is one essential strategy. There are many different models. The one we have developed is given below. It is based on problem solving models from General Motors (Kolb & Baker, 1980), from G. Polya's book How to Solve It (1957), and from Thomas Gordon's book Teacher Effectiveness Training (1974). Our model has five steps.

Five Step Model for Solving Problems

1. Understand the Problem
   - If people are involved, then there should be explicit agreement among the people on what the problem is.
   - If appropriate, analyze the problem for possible causes. (In mathematics causes are usually not involved.)
2. Brainstorm for Possible Solution Strategies
   - No evaluations or judgments should occur here. This should be a free-wheeling act of generating ideas.
3. Choose a Tentative Solution Strategy
   - For "people" problems, consequences of behaviors and solutions must be carefully considered.
   - If people are working out an interpersonal problem, then the tentative strategy will likely be a compromise.

4. Carry Out the Tentative Strategy

   ° In implementing most strategies involving people, it is important to decide, "Who, does What, When."

5. Learn

   ° Immediately and over time think about what can be learned from the experience. What are the implications of what has been done?

   ° If appropriate, evaluate the effectiveness of the solution. (You may have to start over.)

To demonstrate the versatility of this model, consider the following three examples which have been solved by teachers, students, school administrators, and business people using the five-step model. The first problem is from a General Motors training manual. The second problem is from the Institute for the Advancement of Philosophy of Children. The third problem is taken from the 1980 Yearbook for the National Council of Teachers of Mathematics.

Example 1.

Your company has just obtained a one-year contract for delivering six truckloads of hazardous materials a month. All six trucks are enroute, and this is the first time any one of you has driven this busy road. All trucks are identical though they are loaded differently. You will make 11 more deliveries this year.

The second truck is immediately behind the first truck, which is pulling a forklift. Four other trucks are about 15 minutes behind on the same road. The first truck went under a concrete underpass with no problem, but the second truck got stuck. Comparing

the shipping documents you realize the first truck is carrying 400 containers weighing 50 pounds each. The second truck carries 300 larger containers that only weigh 40 pounds each. The cargo is on pallets. There is an open truck service station ahead. It has a fully equipped wrecker for servicing trucks on the highway. All the trucks must arrive at the destination 20 miles ahead within one hour or your company will have to pay penalties. There is an alternate route behind you but it is 10 miles longer with equally heavy traffic. You are members of the crew driving the stuck truck. What will you do?

Example 2.

Your best friend won't graduate if she doesn't turn in a long overdue paper. But she's got some kind of hang-up about it and can't write it, so now the two of you are wondering if maybe you should write it for her. You have a number of options. Which one would you choose?

Example 3.

James and Judy both work part-time in a cafeteria that is open seven days a week. James works one day and then has three days off before he works again. Judy works one day and then has four days off. James works this Monday and Judy works this Tuesday. Show the days that James and Judy will work on the same day.

At the beginning, we have our students follow the Five Step Model, step by step. Later on they are encouraged to freely use their own

creativity and intuition to solve problems since no single model is directly applicable to all problems.

The Five Step Model is currently being used by students for their academic work and for their interpersonal lives. But is the model also practical for the work place? The answer is "yes." Students use it in their part-time jobs, and General Motors uses it to get people to work together to solve problems. Employees cooperate in GM's Employee Participation Groups to solve on-the-job problems. In a 1983 personal interview, Kathy York of GM's Research and Development Division stated that competition among workers often turns out to be a liability. "They work separately against each other. We need our employees to work together to solve problems. That will increase their job competence." The problems that the groups focus on are not generally psychological ones; they are job-related problems. Workers, supervisors, managers, and executives get involved in the groups. Whoever is being affected by the problem or the solution is in the group. They use a model very similar to the Five Step Model.

The Need for Transfer

For general problem solving, a model is necessary but it is not sufficient. Transfer is one of the deficiencies. Schools teach problem solving, but most students have difficulty transferring their problem solving capabilities from one setting to another (Johnson, 1984; Snowman, 1984). A recent experience made this "breakdown in transfer" more meaningful to us. We were conducting a workshop on problem solving skills and during the last half of the workshop a high school math teacher who systematically uses Polya's problem solving model remarked

that he did not know what he was going to do about equipment and visuals since his school's budget had declined each of the past three years. There was a slight pause, then one of the workshop participants asked, "Have you thought about applying your problem solving model to that problem?" The teacher said, "No." Why didn't this math teacher transfer his problem solving skills from math to the situation of a reduced budget and probably less math equipment? We believe there are two major reasons for lack of transfer.

1. Not enough diverse kinds of problems are given to students to encourage transfer over a wide range of settings. Only math problems are given, or science problems, or social studies problems, and so on. These problems are context bound. They are too similar to each other. There are many commercial programs for teaching problem solving, and they provide a wide variety of problems. The June 1983 issue of the Kappan listed more than 30 programs, video-taped presentations, computer-assisted instruction, instructional programs for teachers, and materials for student use. Other excellent sources are:
   - The Edward deBono School of Thinking, P. O. Box 711, Larchmont, NY 10538.
   - Institute for the Advancement of Philosophy for Children, Montclair State College, Upper Montclair, NJ 07043.
   - The Productive Thinking Program from the Charles E. Merrill Publishing Company in Columbus, OH.
   - Problem Solving and Comprehension by Arthur Whimbey and Jack Lochhead, The Franklin Institute Press, Philadelphia, 1979.

- More Life Skills by Joan Hearn, Advanced Development Division, Employment and Immigration, Ottawa, Canada K1A 0J9, 1982.
- Problem Solving in School Mathematics, 1980 Yearbook, National Council of Teachers of Mathematics, Reston, VA.
- Instrumental Enrichment by Reuven Feuerstein, University Park Press, Baltimore, 1980.
- The New MCAT Student Manual (Quantitative Skills) from the Association of American Medical Colleges, Washington, DC, 1984.
- Medical College Admission Test (Quantitative Skills) by Morris Bramson and Lawrence Solomon, Arco Publishing, Inc., NY, 1982.
- A Complete Preparation for the New MCAT, Vol. II (Quantitative Skills) by Beryl Brain, Drew Love, and Philip Kelleher, Health Professional Education Service, Inc., Bethesda, MD, 1981.

If Molitor (1981) is right in his predictions that by the year 2000 76% of the work force will be in information/knowledge/education enterprises and other services, then the last three references will be particularly good sources of problems to prepare students for the future.

2. Most students are not explicitly taught strategies for solving problems. Some strategies are: Using a model, reading information carefully, breaking the problem into manageable parts, and making a sketch. We have taught strategies to students,

they have learned them, and they have improved their problem solving.

STRATEGIES FOR SOLVING PROBLEMS -- GENERAL GUIDELINES

Guidelines from deBono

Edward deBono has formulated guidelines for good thinking and problem solving. His system has been adopted by corporate executives, taught in schools, and studied by government officials from more than a score of countries. Here are basic tools taken mostly from deBono's The Learning-To-Think Coursebook (1982).

1. Consider all Factors and Don't Limit Perceptions.

A conscious effort should be made to think of everything that might be relevant for solving the problem. Suppose you're thinking about buying a new house. Consider all factors to be sure you ask all the right questions. While obvious issues such as size, cost and layout are bound to come to mind, without a deliberate effort to list every relevant factor you might overlook others. How good is TV reception? Is there a local leash law? Can the pipes be drained quickly in case of a power failure in freezing weather?

Recall our discussion about the math teacher who didn't think about using a problem solving model from math class to help him solve the problem of a smaller budget and at the same time a need for more learning resources. He limited his point of view--he had access to more than he was using. This is not uncommon for problem solving. Try this experiment: Look around the room for red objects. (Don't read on until you've done so.) Now close your eyes and ask yourself how many green objects there are. Look again. Surprised? It was your focused attention on red that kept you from noticing things of another color.

Even after using various tools of thought, you may not have found a satisfactory solution to your problem. The key to finding alternatives is to look for possibilities outside your usual thinking patterns. Edison, in searching for a light-bulb filament, tried thousands of unlikely materials including cork, fishing line and tar, before succeeding with a strip of carbonized cardboard.

2. Consequences and Sequels.

One of the traits that makes us different from animals is our ability to imagine the outcome of our actions. But we can greatly improve this ability by learning to use it in a systematic way. The deBono technique is to image the probable outcome of a decision at four distances in the future: Immediate, short term (1 to 5 years), medium term (5 to 25 years) and long term (over 25 years). By weighing the consequences of thoughts and actions, people can be less impulsive and make better decisions for themselves, based upon careful thought and not on quick emotion.

3. Aims, Goals, Objectives.

An often unused tool of better thinking is the practice of making a list of reasons for doing a particular thing. Often people assume they know what their goals are, but often they have hidden or unconsidered goals that get in their way. Also, people will often just "act out" without considering whether the behavior will get them what they want.

Setting priorities and goals can help people be more efficient. Sometimes there are so many things to do that it is overwhelming. To sit down and list the first priority, then the second, etc., can help the tasks become manageable.

Defining goals can also help lead to creative solutions to problems. DeBono tells of a grandmother trying to knit while her yarn was being tangled by the family toddler. Exasperated, she put him in his playpen, but he howled so loudly that she had to take him out. Then she realized that her goal wasn't to pen the child, but to separate him from her yarn. So she solved the problem by leaving him out--and climbing into the playpen herself.

4. Other Points of View.

Often problems involve a conflict with someone such as a friend, parent, boyfriend, or girlfriend. It is the mark of a good problem solver to be able to find a solution that will agree with the other person's viewpoint. It is particularly difficult to do when one is upset or angry. But if you can take another person's point of view at such times, then you have one of the major skills of good problem solvers.

DeBono tells of an incident where he bought a new car radio from a dealer who recommended it highly. It proved no better than the one it replaced. He was about to charge into the dealer's store and demand his money back, but it occurred to him to put himself in the dealer's place. Doing this, deBono saw how offended he'd be at having his judgment questioned. So he took a different tack and appealed to the dealer's sense of self-respect. The dealer exchanged the radio for a much better one, without charging the difference.

Guidelines from Whimbey and Lochhead

An additional set of guidelines for problem solvers is given by Arthur Whimbey and Jack Lochhead in Problem Solving and Comprehension

(1979). They describe the beliefs, practices, and tendencies of good problem solvers, and also the characteristics of poor problem solvers.

1. Positive Attitude.

Good problem solvers have a strong belief that academic reasoning problems can be solved through careful, persistent analysis. Poor problem solvers, by contrast, frequently express the opinion that "either you know the answer to a problem or you don't know it, and if you don't know it you might as well give up or guess." Poor problem solvers haven't learned that a problem may at first appear confusing and that the way to work the problem can be gradually analyzed and solved. Poor problem solvers lack both confidence and experience in dealing with problems through gradual and sometimes lengthy analysis. Problem solving progresses one step after another until the problem is solved.

2. Thoroughly Understanding the Data and the Problem.

Good problem solvers take great care to understand the facts and the relationships in a problem fully and accurately. They are most compulsive in checking whether their understanding of a problem is correct and complete. By contrast, poor problem solvers generally lack such an intense concern about understanding. For example, good problem solvers sometimes reread a problem several times until they are sure they understand it. Poor problem solvers, on the other hand, frequently miss a problem because they do not know exactly what it states. Poor problem solvers have not learned how important it is to try to be completely accurate in understanding all of the ideas of a problem.

In our problem solving classes we give students many problems which involve tabular and graphical data. We are surprised at the number of students that do not carefully analyze the given data before starting to

solve the problem. Instead, they just jump in and then jump to conclusions. It's a lethal habit. Focused effort must be made at the beginning to identify key information and eliminate extraneous data.

3. Breaking the Problem into Parts.

Good problem solvers have learned that analyzing complex problems and ideas often consists of breaking the ideas into smaller steps. They have learned to attack a problem by starting at a point where they can make some sense of it, and then proceeding from there. In contrast, poor problem solvers have not learned the approach of breaking a complex problem into sub-problems--dealing first with one step and then another.

4. Avoid Guessing.

Poor problem solvers tend to jump to conclusions and guess answers without going through all the steps needed to make sure that the answers are accurate. Sometimes they make intuitive judgments in the middle of a problem without checking to see whether the judgments are correct. At other times they work a problem part of the way, but then give up on reasoning and guess on an answer. Good problem solvers tend to work problems from beginning to end in small, careful steps.

The tendency for problem solvers to make more errors--to work too hastily and sometimes skip steps--can be traced to the three characteristics already discussed. First, poor problem solvers do not strongly believe that persistent analysis is an effective way (in fact the only way) to deal with problems. Thus their motivation to persist in working an entire problem precisely and thoroughly, until it is completely solved, is weak. Second, they tend to be careless in their reasoning. They have not developed the habit of continuously focusing and checking on the accuracy of their conclusions. And third, they have not learned

to break a problem into parts and work it step-by-step. As a result of these three characteristics, poor problem solvers have a strong tendency to make hasty responses as they work academic reasoning problems, causing errors in both simple computations and in logic.

5. Activeness in Problem Solving.

The final characteristic of good problem solvers is the tendency to be more active than poor problem solvers when dealing with problem solving. Put simply, they do more things as they deal with a problem. For example, if a written description is hard to follow, good problem solvers may try to create a mental picture of the ideas in order to "see" the situation better. If a presentation is lengthy, confusing, or vague, they try to pin it down in terms of familiar experiences and concrete examples. Furthermore, they will ask themselves questions about the problem, answer the questions, and "talk to themselves" as they try to clarify their thoughts. They may try a flow-chart, brain-storm for possibilities, write on the problem, make diagrams, or use other physical aids to thinking. All in all, good problem solvers are active in many ways which help them get a clearer understanding and how to progress through them.

The Problem Solver's Knowledge Base

Robert Glasser (1984) stated that the knowledge of novice problem solvers is organized around the literal objects explicitly given in a problem statement. Experts' knowledge, on the other hand, is organized around principles and abstractions that subsume these objects. These principles are not apparent in the problem statement but derive from knowledge about the things in the problem or the subject matter associated with the problem. Knowledge of dietetics is needed to solve problems of

nutrition, knowledge of auto mechanics is needed to fix a car, and so on. The problem-solving difficulty of novices can be attributed largely to the inadequacies of their knowledge bases and not necessarily to limitations in their processing capabilities, such as the inability to use problem-solving strategies. "Current studies of high levels of competence support the recommendation that a significant focus for understanding expert thinking and problem solving and its development is investigation of the characteristics and influence of organized knowledge structures that are required over long periods of time" (p. 99).

For example, the authors have experienced for many years the difficulty even gifted students have in solving time-rate-distance problems. We believe the difficulty centers on students' lack of knowledge of the time-rate-distance characteristics of objects as they move toward and away from each other. For instance, consider the problem:

> Car A starts from a point going East averaging 60 MPH, and at the same time Car B starts West from a point 300 miles away from Car A's starting point and averages 40 MPH. How long will it take for the two cars to meet?

Many students cannot do this problem because they don't know that, when two objects start from rest and move toward each other, when they meet they will have travelled the distance they were apart at the beginning. Thus, the solution to the problem is obtained from $300 = 60t + 40t$ (t is for time). To give meaning to the general strategy for solving such problems, we place two students at opposite ends of the room and tell them the room is 50 feet long. They are to walk toward each other and stop when they meet. After the two students meet, we

ask, "What is the total distance the two students have travelled?" Most of the class now realizes that the answer is 50 feet. They have learned a relationship that can help them solve a whole class of problems. The knowledge learned is general and goes well beyond the specifics of this one problem. Reuren Feuerstein (1980, p. 22) sums it up very well: "It is when cognitive processes become detached from specific tasks that cognitive structures are established. These structures are of a more general nature than the learning of specific tasks and, hence, result in more adaptive behavior by the individual."

Students with a wider knowledge base are better at brainstorming for solutions across a wide range of problems. They are more able to understand and construct analogies, they make more discoveries, they see patterns, and they establish new relationships.

SOME SPECIFIC PROBLEM SOLVING STRATEGIES

There are other strategies that can help people become better problem solvers. The ones to be discussed here are: Thinking aloud, using the trial and error method, working backwards, finding all the possibilities, managing time, logical and critical reasoning, and gathering and analyzing data. We have taught these strategies to students and have witnessed students' growth in becoming confident and skillful problem solvers.

Thinking Aloud

When using this strategy, people say aloud their thoughts while attempting to solve a problem. All mental processing, however, need not be vocalized. For example, it is not reasonable to explain the meaning of every word read for a problem. When a student is insure of what to do, is confused by an idea, or stops for some time to think about it, then some thinking aloud may be appropriate. When the strategy is used, then students should try to think aloud as much as possible. Expressing thoughts, especially at sections of a problem where difficulties or hesitancy arise, is a good way to avoid skipping steps in reasoning, jumping over important information, or being unaware of the point at which being bogged down occurred.

Thinking aloud while solving problems requires practice. At first, many students find it difficult to vocalize their thoughts as they work problems. But students do get used to expressing in words the steps they take and gain confidence in "talking out" the problem in front of the teacher and other students. We use the technique in full class settings, in small groups, and in one-to-one discussions between student

and teacher. The choice of setting depends on the nature of the problem, the students, and the teacher.

The following illustration was taken from John R. Hayes' book, The Complete Problem Solver (p. 56).

PROBLEM Given Jug A which contains nine quarts; Jug B, 42 quarts; and Jug C, six quarts, how could you measure out 21 quarts?

STUDENT: Uh, the first thing is that half of Jug B is the amount you want.

TEACHER: You're right!

STUDENT: Well, you can't get 21 from just multiplying up Jug A or Jug C.

- You can get 18 and 18 respectively, that's as close as you can get, I guess.
- Um, so I'll try to think of different combinations that might . . . or deficit of the 21 quarts . . . and
- Nine and six are fifteen . . . if you took two nines and two sixes, you'd have thirty, which
- Would leave you . . . and pour them into the container, you'd have a,
- An open space of 12, which means nothing. How about . . . see . . . now I'm
- Trying to think of how close to 42 you can get with the nine and the six quantities.
- Nine times five is 45 . . . six times seven is 42.

TEACHER: You're doing fine!

STUDENT: So you can, uh . . . fill B with C evenly.

° If you were to take . . . 36 . . . um, oh, uh, six times four is 24 . . . and if you, uh,

° What I'm trying to get rid of is, is three quarts there . . .

TEACHER: Good.

STUDENT: So if you were to, um . . . still 24. I was trying to think possibly,

° Some way of . . . the difference between the six and the nine is three quarts.

° I was trying to think of . . . a way to uh . . . oh, how about . . . you put the three, six . . .

° Quart quantity into the 42 bottle, which is 18, then the run off, from

° Pouring a nine into a six which is three and 18 is 21.

TEACHER: Well done!

There is a simpler solution to the problem above, but these students found one good solution by talking it over together. From thinking aloud, our students have learned to listen to each other, to locate breakdowns in reasoning, to learn where the stumbling point is, to realize how different people approach the same problem, and to see more than one solution to the same problem on the blackboard at the same time. Students and teachers are often amazed at how much they can learn from each other by thinking aloud.

Problems for Thinking Aloud

1. Box A has 9 green balls and 4 red balls. Box B has 12 green balls and 5 red balls. How many green balls should be moved from Box A

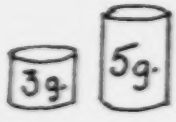
to Box B so the fraction of green balls in Box A is equal to the fraction of red balls in Box B? (From Whimbey and Lochhead, Beyond Problem Solving and Comprehension.)

Solution: Eight green balls must be moved.

Thinking aloud usually leads to a decision to "move" the green balls one-by-one from Box A to Box B until the proportions are the same. Pictures of the boxes could be drawn or a table set up. Other insights are possible when problem solvers think aloud.

No. of green balls moved	Box A				Box B			
	G	R	Total	G/Total	G	R	Total	R/Total
0	9	4	13	9/13	12	5	17	5/17
1	8	4	12	8/12	13	5	18	5/18
2	7	4	11	7/11	14	5	19	5/19
3	6	4	10	6/10	15	5	20	5/20
4	5	4	9	5/9	16	5	21	5/21
5	4	4	8	4/8	17	5	22	5/22
6	3	4	7	3/7	18	5	23	5/23
7	2	4	6	2/6	19	5	24	5/24
8	1	4	5	1/5	20	5	25	5/25 = 1/5

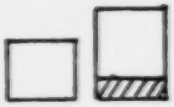
2. How can you measure out exactly 4 glogs of water if you have only a 3 glog container and a 5 glog container? (From Seymour and Gidley, Eureka.)



Solution: Fill the 3 g. container and pour into the 5 g. container.

Again fill the 3 g. container and pour the water into the 5 g. container until it is filled. One glog will remain in the 3 g. container.

Empty the 5 g. container. Pour the 1 g. into the 5 g. container.



Fill the 3 g. container and add it to the 1 g. in the 5 g. container.

(1 glog + 3 glogs = 4 glogs)

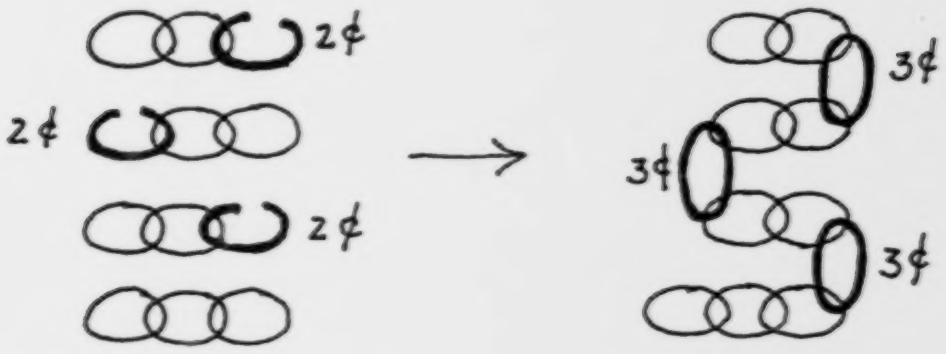
3. Two shepherds owning a flock of sheep agree to divide its value: A takes 72 sheep. B takes 92 sheep and pays A $35. What is the value of one sheep? (From Whimbey and Lochhead, Beyond Problem Solving and Comprehension.)

Solution: The value of one sheep is $3.50. (Assuming that all the sheep have the same value.)

Together there are 164 sheep, so each shepherd should receive the value of 82 sheep. Shepherd A only takes 72 sheep, so shepherd B must pay him for 10 sheep. He pays $35, so each sheep is worth $3.50.

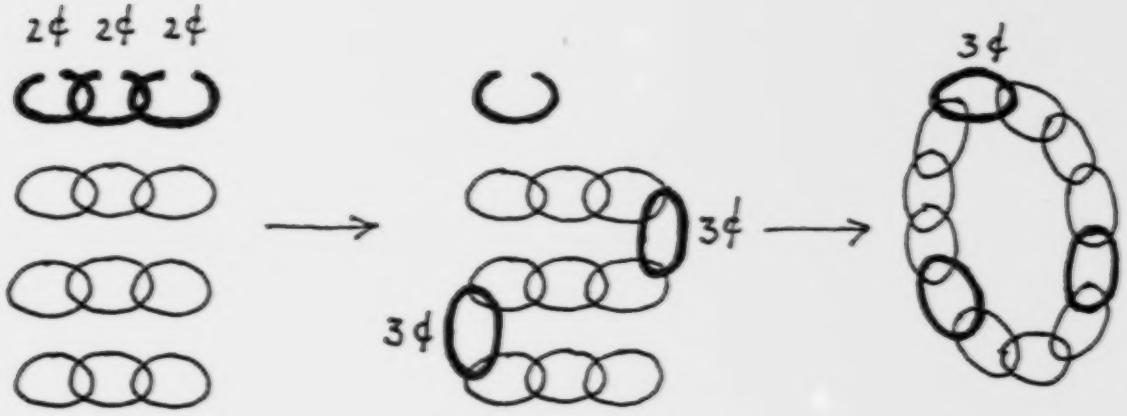
4. You are given four separate pieces of chain that are three links in length. It costs 2¢ to open a link and 3¢ to close a link. All links are closed at the beginning of the problem. Your goal is to join all 12 links of chain into a single circle at a cost of no more than 15¢. (From Wickelgren, How to Solve Problems.)

The first natural attempt is usually the following:



But 15¢ is used up, and the chain is not in a single circle. What to do? Good thinking aloud can follow, individually or especially among group problem solvers.

Solution:



Trial and Error

Trial and error is often underestimated as a problem solving strategy, but it can be a key strategy for some problems. In the search

for a solution, trial and error can be applied systematically by simply trying different solutions to see if they work. More often than not, however, the search can be narrowed by taking into account relevant knowledge and, by inference, reducing the number of solutions to be tried. The following example is from Problem Solving in School Mathematics (p. 137).

PROBLEM

Find the smallest prime number greater than 840.

SOLUTION

Systematic trial and error. If the problem is to find the smallest prime number greater than 840, begin with 841 and try each successive number, checking for prime divisors until a prime is found. Try 2, try 3, try 5, and so on. (An algorithm for checking this could be programmed on a programmable calculator.)

Inferential trial and error. Consider the same problem. We know that numbers greater than 840 whose units digits are 0, 2, 4, 5, 6, and 8 cannot be prime and that every third number will be divisible by 3. Thus, the first few numbers to try are 841, 847, 851, 853, 857, and 859. To see if 841 is prime we check to see if one of the primes less or equal to 841 divides 841. If it does, we repeat a similar procedure for the succeeding numbers until we find the smallest prime.

Trial and error can also be advantageous in getting a feel for a problem. Trying out a reasonable guess, even if it does not work, can give valuable information. For example, if trying to find a decimal approximation for the square root of two, one might try 1.5 (1 is too

small because 1 x 1 = 1, and 2 is too big because 2 x 2 = 4). Since 1.5 x 1.5 = 2.25, 1.5 is too big, but that is valuable information because it directs the next attempt to a number between 1 and 1.5. Teachers should encourage students to make reasonable guesses at times and should specify for them the value of what was learned from the trial and error and how the error can narrow the search for a solution.

This same way of thinking about the information gained from an imperfect attempt can be applied to solutions of interpersonal problems. Suppose a father and his daughter are problem solving about the condition of her room, particularly about the dirty clothes on the floor and on the furniture. An idea to try might be a clothes hamper in her room. Both would agree that it is a trial solution to be evaluated, say, in three weeks. If the solution is not the right one, the attempt still will help to clarify the problem and suggest a better solution.

One roadblock to becoming a good problem solver is reluctance to take a risk. Many adults have been conditioned over the years to believe that there is some strategy or way to proceed in solving a problem that they "should" have learned, and if they can't "remember how to do this kind of problem," they simply give up. Teachers are confronted with this attitude frequently when their students complain that "we haven't had this yet." Indeed, there are many specific approaches to problems that can be learned. But good problem solvers are not hampered by the conviction that there is one way to solve a problem. They do not rely on some outside authority, but have confidence in their own ability to generate ideas. Teachers can encourage students to become self-reliant by freeing them to make reasonable guesses and to use trial and error to gain insight into a problem.

Problems for Trial and Error

1. A student scored 85 on an exam containing 100 problems. She tried to solve all the problems. Her score was figured by subtracting two times the number of wrong answers from the number of correct answers. How many problems did she solve correctly? (From Seymour and Gidley, Eureka.)

Solution: She solved 95 problems correctly.

The thoughtful problem solver knows that 85 right answers would not be the correct solution because then twice the number of wrong answers must be subtracted. But that is not a bad place to start, to get a feel for the problem.

Right	Wrong	2 X Wrong	Score (Right - 2 X Wrong)	
85	15	30	85 - 30 = 55	85 is too small
90	10	20	90 - 20 = 70	90 is too small
95	5	10	95 - 10 = 85	Voila!

NOTE: This kind of problem is usually solved by using simultaneous linear equations:

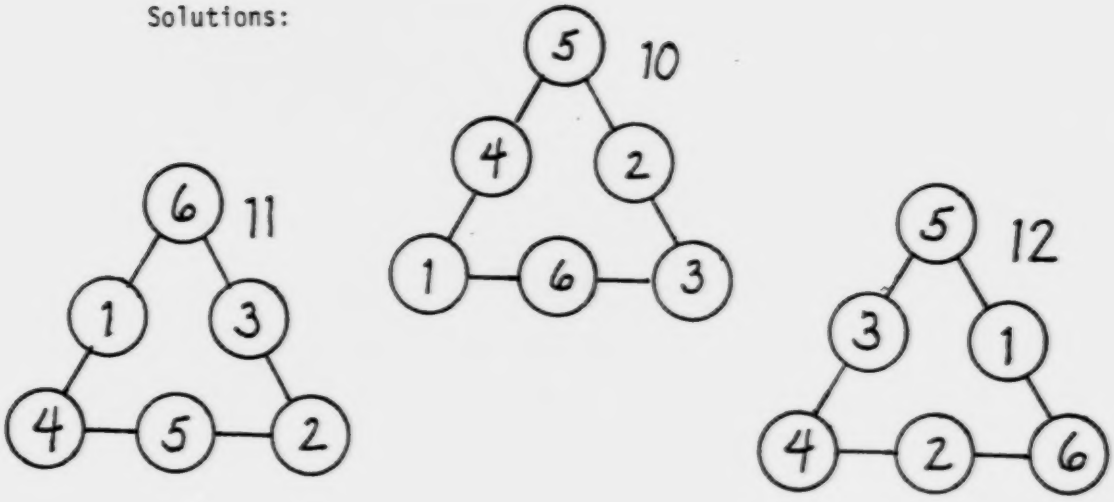
Let r = no. right and w = no. wrong. Then

$$\begin{aligned} r - 2w &= 85 \\ r + w &= 100 \\ -3w &= -15 \\ w &= 5 \text{ ; } r = 95 \end{aligned}$$

When students can organize their trials systematically, many problems traditionally reserved for algebra courses can be solved by trial and error.

2. Place the numbers 1, 2, 3, 4, 5, 6 in such a way that each side of the triangle adds up to 10. Then to 11. Then to 12. (From Dolan and Williamson, Teaching Problem-Solving Strategies.)

Solutions:



3. The difference between two numbers is 37; their sum is 215. What are the numbers? (From Dolan and Williamson, Teaching Problem-Solving Strategies.)

Solution: The numbers are 89 and 126.

Numbers		Sum	
1	38	39	(too small)
200	237	437	(too large)
100	137	237	(too large)
90	127	217	(too large)
89	126	215	

This problem could be solved with simultaneous linear equations ($x - y = 37$ and $x + y = 215$). But algebra is not necessary. Judicious trial-and-error narrows the search for a solution.

4. Show how to make change for a dollar bill by using exactly fifty standard coins. (From Seymour and Gidley, Eureka.)

Solution: 45 pennies, 2 nickels, 2 dimes, 1 quarter

Try something. Anything! See where it leads.

	1¢	5¢	10¢	25¢	50¢	Total no. of coins	
This should be close:	50	--	--	--	1	51	TOO MANY
Maybe less pennies?	45	1	--	--	1	47	TOO FEW
Break up the 50¢ piece?	45	1	--	2	--	48	TOO FEW
Break up a quarter?	45	2	2	1	--	50	EUREKA!

NOTE: There is a second solution: 40 pennies, 8 nickels, 2 dimes.

Working Backwards

Sometimes it is easier to solve a problem by working backwards rather than attacking the problem head on. Working backwards involves a change in perspective in that the new starting point was the original goal and the original starting point the new goal. Working backwards can be helpful because problems are often easier solved in one direction than another.

As an example, consider the following problem from Moshe Rubenstein's Patterns of Problem Solving (p. 19).

PROBLEM How many tennis matches of single elimination must be played by 1025 players before a winner is declared?

Most of our students start at the beginning by figuring there would be initially 512 games with one player getting a bye. Next there would be 256 matches with one bye, then 128 (1 bye), 64 (1 bye), 32 (1 bye), 16 (1 bye), 8 (1 bye), 4 (1 bye), 2 (1 bye), 1 (1 bye), finals. The sum of 512, 256, 128 . . . 4, 2, 1, 1 is 1024.

It is much more direct and general to start from the end and view one winner and 1024 losers and note that each loser would play one losing game in a single elimination tournament. So there would be 1024 matches.

This working backwards technique not only yields a solution, it also displays a unique strategy that can be used on many problems. The solution path for this problem is more important than the answer since the path yields a general method for solving such problems--work backwards. The solution is known for any number of N players; that is N-1.

Working backwards has many useful applications. Suppose you are writing a position paper to your boss to convince her to accept a particularly crucial idea. In thinking about how to draft the paper, you might begin by working backwards and ask yourself, "What kinds of questions would she ask me? What would be her major objections? How do I keep from offending her?" By working backwards, by starting with the goal, a more convincing paper can be written.

Problems for Working Backwards

1. A prince picked a basket full of golden apples in the enchanted orchard. On his way home, he was stopped by a troll who guarded

the orchard. The troll demanded payment of one half of the apples plus two more. The prince game him the apples and set off again. A little further on he was stopped by a second troll guard. This troll demanded payment of one half the apples plus two more. The prince paid him and set off again. Just before leaving the enchanted orchard, a third troll stopped him and demanded one half of his apples plus two more. The prince paid him and went sadly home. He had only two golden apples left. How many apples had he picked? (From Meyer and Salee, Make It simpler.)

Solution: The prince had picked 44 apples.

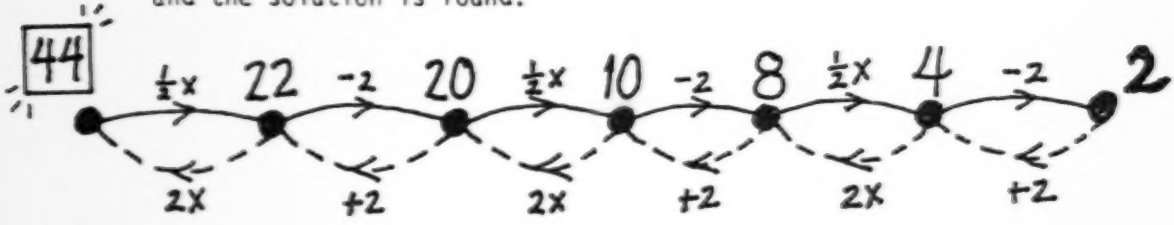
After meeting the third troll, the prince had two apples left. Just before that, he gave the troll two apples. So he must have had four. Just before that, he gave the troll half of what he had. So he must have had eight apples when he met the third troll. After meeting the second troll, the prince had eight apples left. Just before that, he gave the troll two apples. So he must have had ten. Just before that, he gave the troll half of what he had. So he must have had twenty apples when he met the second troll. After meeting the first troll, the prince had twenty apples left. Just before that, he gave the troll two apples. So he must have had twenty-two. Just before that, he gave the troll half of what he had. So he must have had forty-four apples when he met the first troll.

NOTE: Frederique Papy, a Belgian mathematician, has used arrow diagrams with pre-college students with great success. The

solution for a "working backwards" problem is very straightforward using arrow diagrams. The problem is first translated into arrow language:

The dots represent numbers and the arrows indicate relations. The drawing above shows that from the unknown number of apples that the prince picked, half were given to the first troll, then two apples more. Same for the second and third trolls. The prince was left with two apples.

Then arrows for the inverse of -2 and 1/2X (+2 and 2X) are drawn. Starting with the dot for two, the rest of the dots are labelled and the solution is found.



2. I was walking to school with a group of friends one day last week when Lyn found a flier in the gutter which said that Jake's Frozen Yogurt store was having a half-price sale on cones that afternoon to celebrate its tenth anniversary of being in business. Everybody got all excited because none of us had heard about the sale before and we all agreed to tell only a few people (who wants to wait in line forever?)

During morning recess, each of us told one person. Then during the lunch break, everyone who knew at that time told one more person. Finally, during the afternoon recess, everyone who knew then told one more person. After school, the 48 people who knew headed directly to the store, and I still had to wait a long time for my cone. But it was worth it.

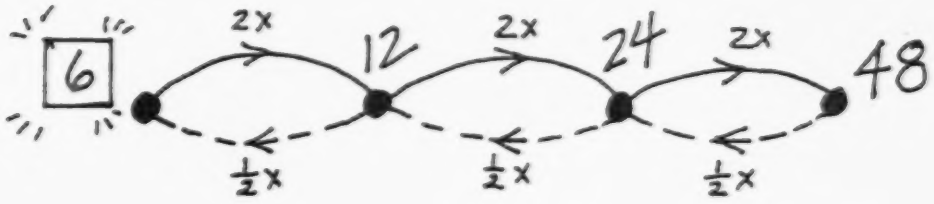
How many of us were walking to school together? (From Meyer and Sallee, Make It Simpler).

Solution: There were six people walking to school together.

48 people knew after school. So 24 people told one other person at afternoon recess.

Twenty-four people knew after lunch break. So 12 people told one other person at lunch break.

Twelve people knew after morning recess. So six people told one other person at morning recess. So six people were walking to school together.



3. Three people play a game in which one person loses and two people win each game. The one who loses must double the amount of money that each of the other two players has at that time. The three players agree to play three games. At the end of the three games,

each player has lost one game and each person has $8. What was the original stake of each player? (From Wickelgren, How to Solve Problems.)

Solution: $13, $7, $4

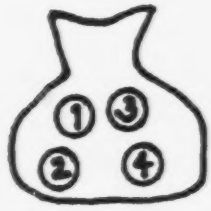
For this problem, a table is useful for working backwards:

	Loser of Game 1 (P1)	Loser of Game 2 (P2)	Loser of Game 3 (P3)
At the end of Game 3	$8	$8	$8
At the end of Game 2	4	4	16
At the end of Game 1	2	14	8
Before Game 1	13	7	4

Finding All the Possibilities

Another important strategy for problem solving is to have a systematic way of listing all possible outcomes of some occurrence. The system must insure that all possibilities are listed and also that only those possibilities which "make sense" from the structure of the problem are listed. An example of an orderly way to list all possible ways for something to happen or all possible arrangements is shown below. Thinking exercises about drawing marbles from bags are useful for developing orderly ways to exhaust all possibilities and they are generalizable to a large number of actual situations.

EXAMPLE. Suppose there are four marbles in a bag, numbered 1, 2, 3 and 4. What are all the ways to draw out the marbles if, once a marble is drawn, it is not returned to the bag? One orderly way of thinking is to actually make a list with the help of a running conversation with oneself:



"OK. Suppose I happen to take out the 1 first?" 1

"Now, I'll list all the ways if the 2 comes second. (Then later, if the 3 comes second and if the 4 comes second.) So there is 12 followed by 34 and 12 followed by 43. And there is no other way for 1 followed by 2." 1 2

1 2 3 4
1 2 4 3

"Now, what are all the ways for 1 first and 3 second? There is 13 followed by 24 and 13 followed by 42. And there is no other way for 1 first and 3 second." 1 3

1 3 2 4
1 3 4 2

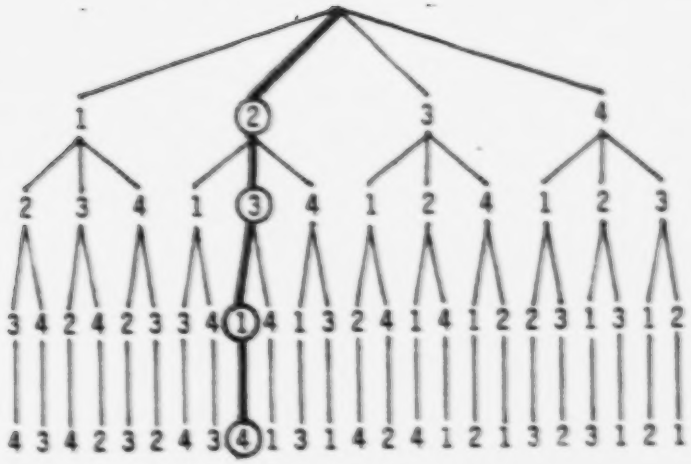
"Finally, what are all the ways for 1 first and 4 second? There is 14 followed by 23 and 14 followed by 32. And there is no other way for 1 followed by 4." 1 4

1 4 2 3
1 4 3 2

A similar conversation goes on with oneself to generate all the arrangements when 2 is drawn first, when 3 is drawn first, and when 4 is drawn first. The results:

2 1 3 4	3 1 2 4	4 1 2 3
2 1 4 3	3 1 4 2	4 1 3 2
2 3 1 4	3 2 1 4	4 2 1 3
2 3 4 1	3 2 1 4	4 2 3 1
2 4 1 3	3 4 1 2	4 3 1 2
2 4 3 1	3 4 2 1	4 3 2 1

So, there are 24 ways to draw four marbles in order if the drawn marble is replaced in the bag. Every possibility is listed and there are no more. Another skill for finding these 24 possible ways is to draw a "tree:"



4 choices for 1st marble

3 choices for 2nd marble
(so far 4 x 3 or 12)

2 choices for 3rd marble
(so far 4 x 3 x 2 or 24)

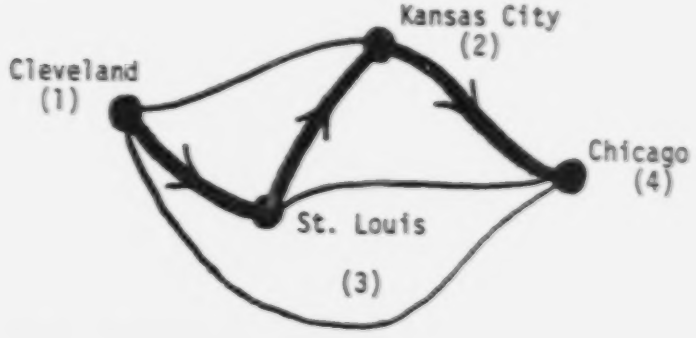
1 choice for 4th marble
(4 x 3 x 2 x 1 or 24)

There are 24 "paths" down this "tree" and the one that is indicated above represents the combination 2 3 1 4.

The skill of drawing a tree to determine all possibilities is an important one. Suppose all the possible ways to arrange 10 digits (without replacement as in the example above) were critical information for the solution to a problem. Listing all the possibilities would be formidable and the tree would be impractical to draw. But by reducing the problem to a simpler problem (another problem solving strategy) one could realize that there is a pattern for finding the number of combinations. The tree for the 4-digit problem makes it clear that there are 4 x 3 x 2 x 1 or 24 ways to arrange four digits. So it is logically sound to compute 10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1 to find the number of ways to arrange 10 digits (without replacement).

This kind of thinking is a useful problem solving skill. The 4-digit problem has the same structure as figuring out, for example:

- How many different ways can 4 colors be used to paint a car if the colors for the body, the top, and two parts of the trim are arranged differently? (24 ways)
- What is the probability of drawing a "winning number" 2 1 4 3 from a box containing four chips labelled "1," "2," "3," and "4?" (1/24 or 1 of the 24 possibilities).
- How many different routes are there which reach all of 4 cities only once and which could originate in any of the four cities? (24) One such route, (1) Cleveland to (3) St. Louis to (2) Kansas City to (4) Chicago, is shown below. The illustration shows that regardless of the city of origin, any other city can be reached next, making this situation analagous to the 4-digit problem.



Very often, the number of ways to do something or the likelihood of an event occurring is important information for solving a problem, not only in mathematics, but also in other situations. It is a skill that can and should be taught as one of many problem solving strategies.

Problems for Finding All the Possibilities

1. Jean buys 3 skirts, 4 blouses, and 3 sweaters. She intends to wear them in various combinations. The blue skirt doesn't go with the green sweater, but other wise any combination of the three garments is attractive. How many different combinations can Joan make that include a skirt, a blouse, and a sweater? (From Dolan and Williamson, Teaching Problem-Solving Strategies.)

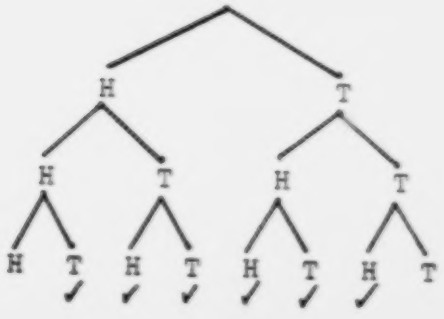
   Solution: 32 combinations

   The 3 skirts, 4 blouses, and 3 sweaters make 36 combinations. But the combinations having a blue skirt and green sweater must be eliminated. There are four of these (blue skirt and green sweater with each of the four blouses). (3 X 4 X 3) - 4 = 32

2. Three people each toss a penny at the same time. What is the probability that two people get the same side of the penny and the other person gets the opposite side? (From Fisher and Medigovich, Problem of the Week.)

   Solution: The probability is 3/4.

   Suppose H stands for heads and T stands for tails. The possible combinations are:



There are eight outcomes. The only combinations that do not fit the situation are three heads or three tails. So six of the eight possibilities are for two people getting the same side and one person getting the opposite side. The probability is 6/8 or 3/4.

3. The Busy Bee Cafe offers these choices on its dinner menu:

MEAT DISHES	VEGETABLES	SALADS	DESSERTS
Roast Beef	Corn	Fruit	Pie
Chicken	Peas	Fresh Green	Ice Cream
Lasagne			

If you choose one item from each category, how many days can you eat meals at the Busy Bee before you eat the same dinner a second time? (From Dolan and Williamson, Teaching Problem-Solving Strategies.)

Solution: 3 X 2 X 2 X 2 = 24, so you can eat 24 meals before you eat the same dinner twice.

NOTE: See the problems following the section Logical and Critical Reasoning. Finding all the possibilities is a skill needed to solve some of those problems.

Time Management

Time management can influence problem solving. Poor scheduling can lead to insufficient time to work through a solution to a problem, or perhaps to never even getting to the problem. Problems can be solved only by taking time to solve them. An appropriate amount of time must be allocated for reflecting on the problem, for considering different ways to approach a solution, and for reviewing and critiquing the steps used. The pressure that can result from poor scheduling can cause subpar problem solving by limiting the amount of planning time and the

time needed for patient deliberation. A student's patience and perseverance is often a key to good problem solving. A necessary condition for this is good time management skills.

We have recommended to students that they keep a chart of their activities to use as a basis for managing their time better. Time priorities often have to be set each day and a chart or list can help. Some students do not manage their time well enough to acquire an essential piece of knowledge, get to the library, or talk to someone who can help them. Allocating specific blocks of time to specific tasks according to their importance and the time they require is a useful skill. Systematic reflection on one's use of time and on how much is lost if it is used inefficiently can lead students to modify their own behavior.

Time management requires scheduling, but flexibility in following a schedule is also important. For example, there is a problem solving strategy which is useful when one has come to a dead end or exhausted all ideas for approaching a problem. Wickelgren (1974) calls the strategy "incubation" and it means simply to get away from the problem for a while. It is a common experience to "sleep on a problem" and to solve it with a new insight the next day. Even when time is limited, as in taking an exam, going on to other problems and then coming back can be useful. Teachers can model this strategy from time to time by leaving problems with students instead of rushing to solve them before the bell rings.

The key to time management, then, is to recognize the need for time to gather information, to try different ideas, to critique solutions, and also to have the flexibility in one's schedule for some incubation time.

Logical and Critical Reasoning

A lack of logical and critical reasoning skills hinders students' progress in becoming adept problem solvers. The more we listen to students talk aloud about their problem solving, check their papers, and observe their activities, the more we are impressed with the extent of their deficiencies in logical and critical reasoning.

One of the major problems students have is dealing with ambiguities in the English language. For example, consider the real-life story of a famous mathematician who had to take a driving examination. He had memorized many statements from a booklet, including the following:

It is illegal to park within 15 feet of a fire hydrant.

As part of the test, he was given some "true-false" questions, one of which was:

It is illegal to park within 9 feet of a fire hydrant. False __ True __

The mathematician checked "true" on the grounds that if the statement he had memorized was true, then the question in the test was true. The examiner, however, claimed that the correct response was "False," since the statement in the booklet explicitly mentioned "15 feet" and not "9 feet." The mathematician was correct, according to the rules of logic.

Next consider the phrase from the song "Home on the Range:"

". . . and the skies are not cloudy all day."

What on earth does it mean? Does it mean that all day long there is <u>never</u> a cloud in the sky? Does it mean that the skies are not cloudy <u>all</u> day long--there is usually a moment, about 2:15 p.m. or so, when a

bit of sunshine and blue sky breaks through? Just what does it mean? Does it mean that, on the average, the skies are much less cloudy than they were back East? Who knows?

As another example of ambiguity in the English language, consider the two statements:

a) A Swede invented dynamite.

b) A Swede is a European.

The meaning of the indefinite article "A" before "Swede" in these two statements is quite different: In (a) it means one; in (b) it means every.

The phrase ". . . and the clouds are not cloudy all day" was, of course, never intended to be a precise statement about anything. It was intended merely to evoke an image of the clear, bright, sunny West. But even when one tries to be precise, the ambiguities of English can present problems for students.

As an illustration of the role of logical reasoning in problem solving, the following table was given to a class of high school seniors.

Resting Systolic Blood Pressures Found in 20 Patients

Morning Patients (Doctor I)				Afternoon Patients (Doctor II)			
Patient Number	Sex	Age	Pressure (mm Hg)	Patient Number	Sex	Age	Pressure (mm Hg)
1	F	25	120	11	F	22	122
2	M	42	150	12	F	47	151
3	F	22	120	13	M	21	118
4	F	35	135	14	F	40	133
5	F	45	145	15	F	44	141
6	F	31	125	16	F	19	126
7	F	21	120	17	F	25	120
8	F	27	130	18	M	22	128
9	F	32	130	19	F	39	133
10	F	20	120	20	F	21	123

Accompanying the table was the statement:

> If a patient had both a morning and an afternoon blood pressure reading taken, then the afternoon reading would be higher.

Students were to select one of the following as their answer:

(A) The statement is supported by the information given.

(B) The statement is contradicted by the information given.

(C) The statement is neither supported nor contradicted by the information given.

Every student in the class of 12 pupils marked "B" because they said that no patient had a morning and afternoon reading. This is an incorrect interpretation of the hypothetical "If . . . then . . ." statement. The correct answer is "C" since no consistent pattern exists of higher readings in the afternoon for individual patients. Who knows what data collected on the same patients in both morning and afternoon would show?

This same class also declared these next two open sentences to be equivalent:

(1) $x(x-3)=0$

(2) $x=0$ and $x=3$

They are not equivalent. In statement (1), x cannot be replaced by both 0 and 3 at the same time. However, the two sentences would be equivalent if the word "and" were replaced by "or."

Students need to be given more practice and guidance in dealing with the logic of problems with a particular emphasis on teachers giving them many sound and appropriate problems to work and listening to them reason aloud. We strongly recommend An Introduction to Logic by Exner and Kaufman (1978) from CEMREL, Inc., St. Louis, Missouri.

Critical reasoning is another area of student deficiencies. Students often lack skills to assess expressed ideas, beliefs and statements which one encounters daily through the media and through remarks made by people in the form of opinions, reports, rumors, etc. There is quite a well-organized body of knowledge on critical reasoning.

The process of critical inquiry is an impartial one. Judgments and evaluations are delayed until the data is in. Observations, people's opinions, collected information, etc., should all be in before decisions are made. The process is to be objective, avoiding preconceived versions of the results. The problem solver should be open to inviting further inquiry if people are not satisfied or problems are not resolved. Also, in critical inquiry people's feelings are often involved. Respect for people's personal dignity must be remembered when people are the objects of the inquiry.

Another important part of critical inquiry is evaluating the assumptions being made during the inquiry. If assumptions are not clearly in mind, then invalid conclusions can be drawn, inappropriate decisions made, or people's feelings hurt. An example from Joan Hearn's (1982) More Life Skills is:

> Willie Jones is a fifteen year old, Grade 10 student who spent Saturday night breaking windows at his high school.
>
> His mother's assumption is that he is a crazy, mixed-up kid.
>
> His father's assumption is that boys will be boys.
>
> His principal's assumption is that there are too many boys like Willie about and that the school is better off without them.

The police's assumptions are that public property must be protected and wrong doers must be discouraged.

It is clear that if Willie's mother were to discuss Willie's activities with his high school principal, neither of them would get anywhere because they would be arguing from different assumptions.

People can improve their critical reasoning skills. And it is evident from our experience that there is no substitute for practice. Students must be given good situations, problems, and simulations from which to develop and sharpen their skills. An excellent source is Joan Hearn's (1982) More Life Skills.

Problems for Logical and Critical Reasoning

1. Betty is shorter than Sally. Cynthia is taller than Sally. Carla is shorter than Betty. Is Sally shorter or taller than Carla? (From Whimbey and Lochhead, Problem Solving and Comprehension.)

   Solution: Sally is taller than Carla.

   A sketch of the problem is useful: Carla Betty Sally Cynthia

2. A man has three hats, one red, one white, and one black. He has three coats, one red, one white, and one black.
   1. He never wears his black hat with his white coat.
   2. He never wears his white hat with his black coat.
   3. He never wears the same hat two days in a row.
   4. He never wears the same coat two days in a row.
   5. He always wears his white coat on Sunday.
   6. He always wears his white on hat on Sunday.

7. He always wears his black hat on Monday.

8. His hat and coat match only on Sunday.

What color hat and coat will he wear on Saturday? (From Dolan and Williamson, Teaching Problem-Solving Strategies.)

Solution: He will wear his red hat and black coat on Saturday.

A table is useful for this solution. The problem solver must first find all the possible combinations of hat and coat colors.

Hat	Coat	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
R	R	7	8	8	8	8	8	5
R	W	7		3		3	4	6
R	B	7		3		3	✓	5
W	R	7	4		4		3	5
W	W	7	8	8	8	8	8	✓
W	B	2	2	2	2	2	2	2
B	R	✓	3		4		4	5
B	W	1	1	1	1	1	1	1
B	B	8	8	8	8	8	8	5

The numbers in the table correspond to the facts used to eliminate a combination for a particular day. The clues lead first to White hat, White coat on Sunday. Then to Black hat, Red coat on Monday. Facts 3 and 4 are then applied, working across the table from Monday to Saturday.

3. In a different language luk eir lail means "heavy little package," bo lail means "heavy man" and luk jo means "pretty package." How would you say "little man" in this language? (From Whimbey and Lochhead, Problem Solving and Comprehension.)

Solution: "Little man" is bo eir.

1. Luk eir lail means "heavy little package;" bo lail means "heavy man." The foreign word the two phrases have in common is lail; the English word they have in common is heavy. So apparently lail means heavy.
2. The phrase bo lail means "heavy man," and since lail means heavy, bo must mean man.
3. Luk eir lail means "heavy little package," luk jo means "pretty package." The foreign word they have in common is luk; the English word they have in common is package. So luk must mean package.
4. Luk eir lail means "heavy little package." Since luk means package, and lail means heavy, eir must mean little.
5. How would you say "little man" in this language? It has been determined that bo means man and eir means little.
6. The foreign language apparently expresses certain ideas in the reverse order of English--adjectives follow nouns. Therefore, "little man" is bo eir.

4. There were three prisoners, one of whom was blind. One day their jailor offered to free them if they could succeed in the following game. The jailor produced three white hats and two red hats and,

in the dark, placed a hat on each prisoner. The prisoners were then taken into the light where, except for the blind man, they could see one another. (None could see the hat on his own head.) The game was for any prisoner to state correctly what color hat he himself was wearing. The jailor asked one of those who could see if he knew, and the man answered no. Then the jailor asked the other man who could also see if he knew, and his answer was no. The blind man at this point correctly stated the color hat he was wearing, winning the game for all three. What color hat was he wearing, and how did he know? (From Meyer and Salee, Make It Simpler.)

Solution: The blind prisoner was wearing a white hat.

The possible combinations are: 3 white hats, 2 white hats and 1 red hat, and 1 white hat and 2 red hats. Call the prisoners S1 (1st sighted prisoner), S2 (2nd sighted prisoner), and B (blind prisoner).

S1 said he did not know. What information does that give us (and S2 and B)?

- S1 did not see 2 red hats. Otherwise, he would have known what he was wearing (white).

S2 said he did not know. What information does that give us (and B)?

- S2 did not see 2 red hats. Otherwise, he would have known what he was wearing (white).

B thought about what he knew.

- B and S2 are not both wearing red and S2 knows that from S1's silence.
- Suppose S2 had seen a red hat on B. Then he would have known he was wearing white.
- Since S2 didn't know, B must be wearing white.

Gathering, Recording and Analyzing Data

The first step in the Problem Solving model is to understand the problem. When full information is presented to a student, understanding the problem involves careful reading, eliminating extraneous information, and for some problems, drawing a sketch or a diagram or organizing given data in a table. These are the usual kinds of problems students are given in school. Unfortunately, most problems encountered in one's life (at work, at home, or socially) are not so "neat." Crucial or helpful information is often missing and the problem solver must have skills not only for obtaining necessary information, but also for recognizing what information is needed. Some examples of such problems follow.

- How can productivity be increased in Plant A?
- How can the absentee rate be reduced?
- What is the least expensive way to get Job X done, considering labor costs, cost of materials and employee morale?
- How do I get my car started so I can get to work on time this morning?
- What steps can I take to effect a behavior change in Person Y?
- To cut costs and maintain sales volume, where can money best be saved in the production of Product X, packaging or advertising?

- What is the best solution for a problem involving a disagreement between labor and management?
- How can the quality of on-the-job training be improved to teach skills more efficiently?
- What are the important variables for increasing morale?
- How can I plan my finances to reserve X amount of money per month for investments?

Data-gathering can occur on many levels. In some cases, unstructured observation is useful. For example, simply watching a production line for an hour could help a person to generate ideas for a more structured efficiency study. Or a task-oriented group could be observed for clues about group discord. More analytical data-gathering involves the use of checklists or coding of events or behaviors. Once data is collected, a second skill is to summarize the information in a meaningful form. If the information is quantitative, data from a checklist can be recorded in a variety of kinds of graphs, tables, or figures. Non-quantitative observation can be categorized or written up as a case study. The skill of selecting a way to represent data interacts with a third skill: Analyzing observational results.

General Motors recognizes that data-gathering is often critical for problem-solving. The manual they use for training employees to conduct Employee Participation Groups includes the following data-gathering skills:

1. Making Check Lists. The following examples from the GM manual show how information can be organized about two different aspects of possible causes of a parts shortage (e.g., type of part and number of shortages by month). Direct observations are recorded as they occur.

Type Of Part	Number Of Shortages By Month												
	J	F	M	A	M	J	J	A	S	O	N	D	Total
001	✓												
002	✓✓												
003													
004													
005													
006													
Other													
Unknown													
Total													

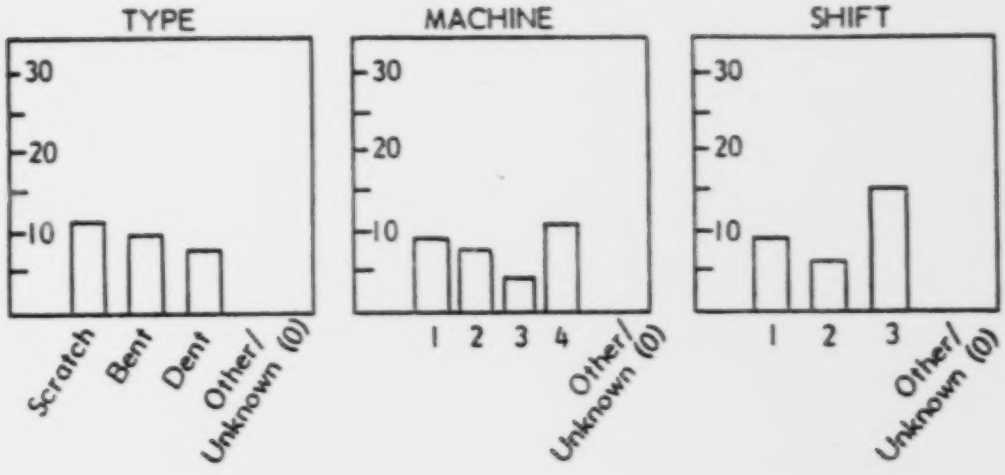
Type Of Part	Number Of Shortages By Shift				
	1	2	3	Other	Total
001	✓				
002		✓	✓		
003					
004					
005					
006					
Other					
Unknown					
Total					

Type Of Part	Length Of Shortage				
	1 Hr.	1 Wk.	1 Mo.	Other	Total
001		✓			
002	✓		✓		
003					
004					
005					
006					
Other					
Unknown					
Total					

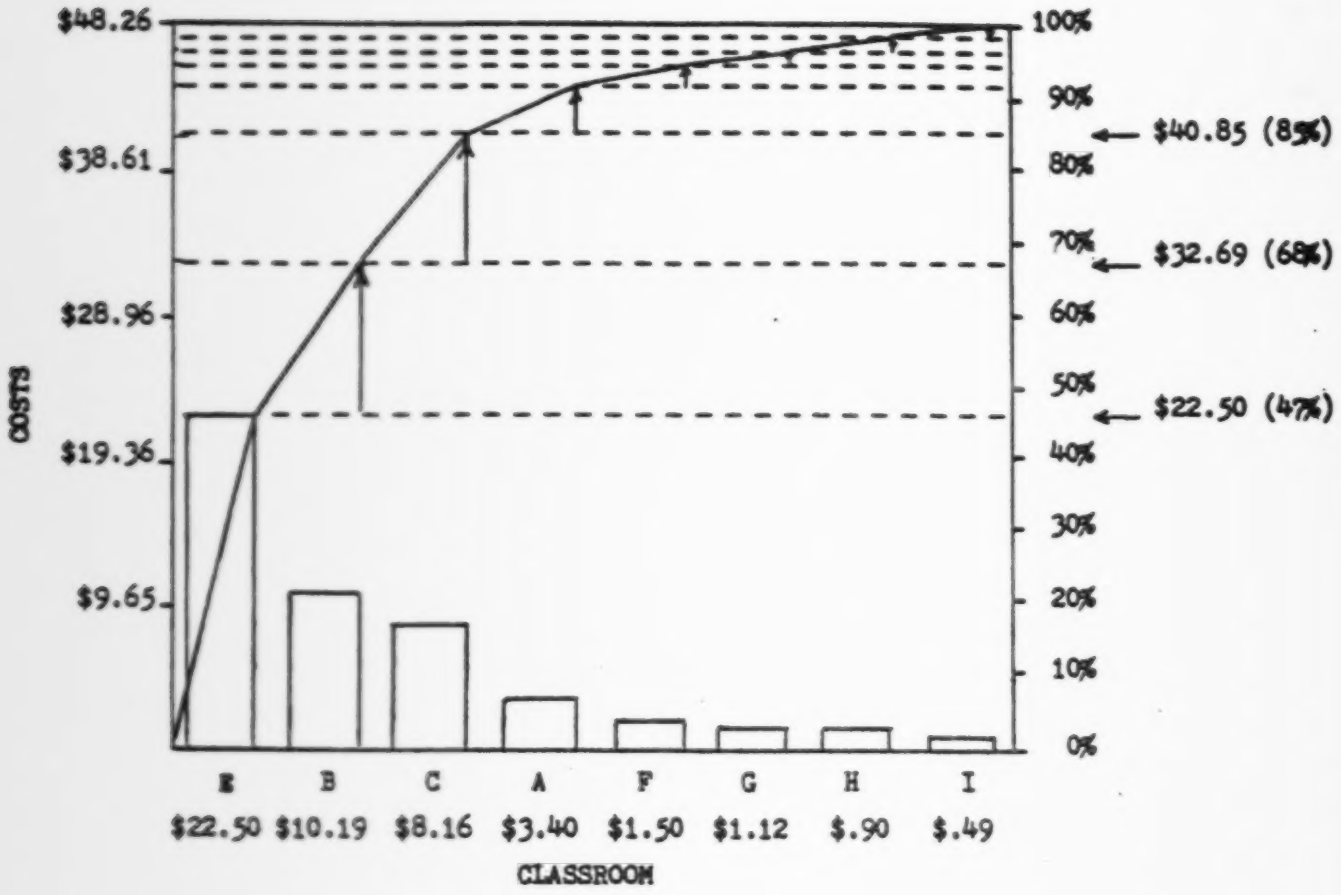
2. Making Charts. Information from check lists can be recorded in charts which help the problem-solver to analyze the problem to be solved. An example:

Type Of Reject	Machine				Total
	1	2	3	4	
Scratch	4	2	1	5	12
Bent	3	1	2	4	10
Dented	1	4	1	2	8
Other/Unknown	0	0	0	0	0
Total	8	7	4	11	30

A second kind of chart is a bar graph. The following graphs indicate that possible causes of rejects to consider first might be (1) something making scratches (12 of the 30 rejects); (2) involved with the 4th machine (11 of the 30 rejects); (3) on the 3rd shift (15 of the 30 rejects).



A third kind of chart is a Pareto chart. Pareto charts organize vital information and data in a cumulative way. In the following example from Lloyd and Rehg (1983), the weekly cost of supplies for eight classrooms has been converted into percentages which have been depicted in a bar graph with the percentages in descending order. The solid line illustrates cumulative percentages. In this example, the graph shows that classrooms E and B are responsible for 68 percent of the total expenditure. One option from this data is to conclude that the other classroom expenditures are "trivial" factors and attention should be focused on the costs for schools E and B.



Social and interpersonal problem solving can also require data-gathering. Much of this must be done via observation of people and their interactions. In conflicts between two people, the needs of both people must be known and good listening skills (to be discussed in a later section) can provide much of the necessary data. For example, if an employee gradually becomes less productive and less cooperative, a supervisor's listening skills might reveal problems ranging from poor health to financial problems to unsatisfactory working conditions. Such information-gathering is critical for interpersonal problem-solving.

Many interpersonal problems involve needs, preferences, or values of groups of people. Useful information can be collected via interest

surveys, evaluation forms, or other questionnaires. One of the most effective ways to improve the quality of training programs is to conduct frequent anonymous evaluations by participants. Tallies of responses to objective items often reveal patterns of possible causes of problems. For example, ratings for the instructor's rapport with the class might be low while ratings for instructional materials are high. Open-ended questions are extremely useful and usually give additional relevant information.

Objective observation of group dynamics is often the key to solving problems involving group cohesiveness and group productivity. In most groups, people assume roles (leader, follower, antagonist, peace-maker, clown, etc.). Observation of interactions among members of a group is useful information for a group facilitator.

Good and Brophy (1978) give many examples of instruments for gathering information about classroom dynamics and teacher behavior. The following form, for example, can be used to determine whether a teacher is giving appropriate feedback to students about the adequacy of their responses in discussion and recitation sessions.

TEACHER FEEDBACK WHEN STUDENT FAILS TO ANSWER CORRECTLY

DIRECTIONS: When a student is unable to answer a question or gives answers incorrectly, code as many categories as apply to the teacher's feedback responses.

BEHAVIOR CATEGORIES

1. Criticizes
2. Says "No," "That's not right," ect.
3. No feedback--goes on to something else
4. Ambiguous--doesn't indicate whether or not answer is acceptable
5. Asks a student or the class whether answer is correct
6. Asks someone else to answer the question
7. Repeats question to same student, prompts ("Well?" "Do you know?" etc.)
8. Gives a clue or rephrases question to make it easier
9. Asks same student an entirely new question
10. Answers question for the student
11. Answers question and also gives explanation or rationale for answer
12. Gives explanation or rationale for why student's answer was not correct
13. Praises student for good attempt or guess
14. Other (specify)

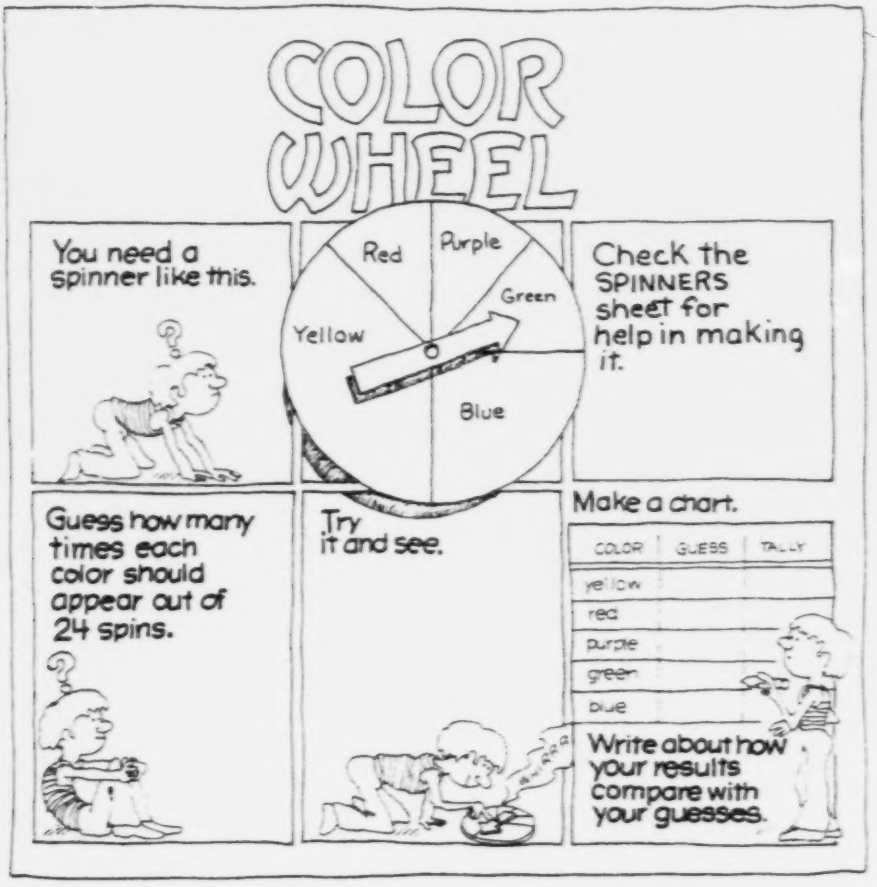
1.	2	13.	____
2.	2,6	14.	____
3.	2,8	15.	____
4.	2,10	16.	____
5.	2,12	17.	____
6.	____	18.	____
7.	____	19.	____
8.	____	20.	____
9.	____	21.	____
10.	____	22.	____
11.	____	23.	____
12.	____	24.	____

If instruction in problem solving is to be transferable to real-life problems, students must learn to gather relevant information and they must be armed with tools for recording and analyzing their observations.

Problems for Gathering, Recording and Analyzing Data .

Practice with data gathering should happen when problems are to be solved in students' school lives. For example, students could conduct a poll to determine the most likely best selling pastry for a fund-raising bakery sale. They could gather information on prices of ingredients to make decisions about which recipes to choose, and so on.

In addition, data can be compiled for problem solving in specific subject matter areas. The Good Time Math Events Book (Burns, 1977) has many data gathering activities. Three of these follow.

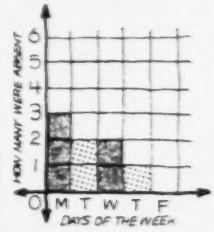


ROLL CALL

Keep a record of how many students are absent in your class.

Do this for one week.

Make a graph.



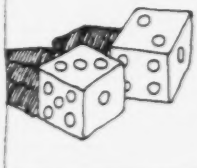
Keep your record for 2 weeks.

Is there one day of the week when more students are usually absent?

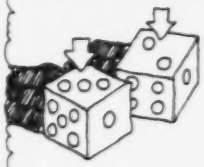
Write about some other things your graph shows.

WHAT SHOWS WITH 100 THROWS?

You need a pair of dice.



If you roll both dice and add the 2 numbers,



the sums you can get are 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12.

Throw the dice 100 times.

Keep a chart. Tally the sums each time they appear.

SUMS	TALLY
2	I
3	I
4	
5	IIII
6	
7	
8	II

What kind of pattern can you see? Write about it.

THE FIVE STEP MODEL EXTENDED FOR PROBLEM SOLVING

The Five Step Model has been developed as an aide for students in solving problems. It is extended here to show how many useful strategies can be embedded within the model.

Extended Model

1. Understand the problem
   - What are the essential data?
   - Is there enough information to solve the problem?
   - Would a figure or sketch help? Maybe introduce symbols or other variables.
   - Separate the problem into manageable parts, if needed. Write down each part.
   - Can the problem be restated in a different way to help understand it?
2. Brainstorm for Possible Solution Strategies
   - Generate a lot of ideas. Don't judge them, just write them down.
   - Has a problem like it been solved before?
   - Would working a related problem be useful?
   - If there were some particular additional information, could the problem be solved? Where would the information be obtained?
3. Choose a Tentative Solution Strategy
   - Remember, the strategy may not work and the process may have to be started over.

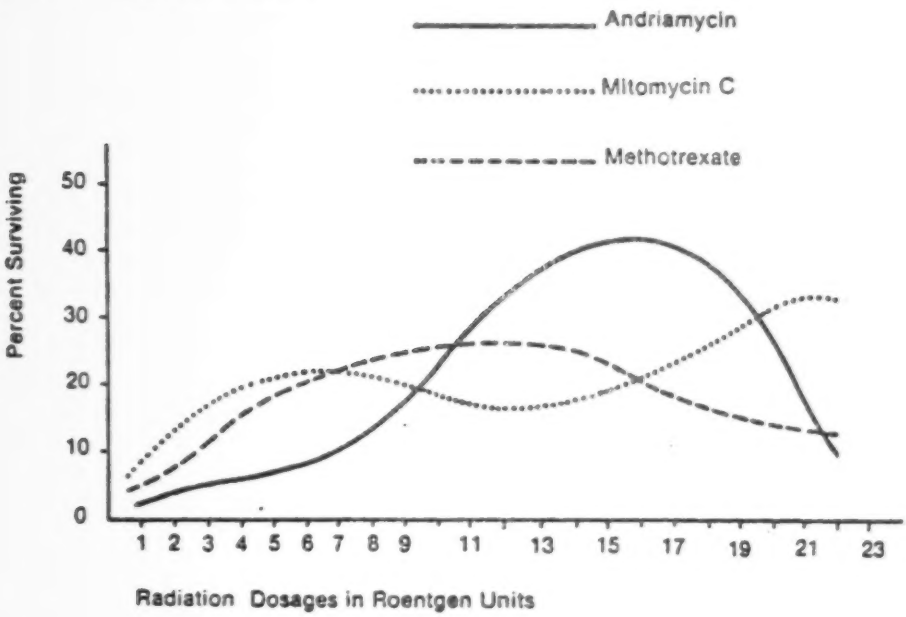
- For "people" problems, consequences associated with carrying out tentative strategies must be carefully weighed.
- Also, if people are working out an interpersonal problem, then the tentative strategy will likely be a compromise. No one is likely to get everything they want.

4. Carry Out the Tentative Solution Strategy
   - Check each step as the plan is carried out. Check that each step is OK. Is each step correct or valid?
   - Are there probably places for errors, mistakes, or faulty reasoning? Where are they?
   - Would it be useful to have someone else go over your steps?
   - For implementing solutions to "people" problems, decide "Who does What, When." Maybe write it down.
5. Learn
   - Check the result if possible. Is the judgment sound? Does it have a reasonable chance of solving the problem?
   - What are the implications or consequences of the solution?
   - Could the problem be worked another way? Perhaps look at other people's solutions and hear what they have to say.
   - If appropriate, evaluate the effectiveness of the solution.
   - Have enough problems like this one been worked to begin to generalize to a plan for solving similar problems?
   - Does this solved problem open up new relationships that hadn't been thought of before? Think about it!
   - What are your strengths as a problem solver? Your weaknesses?
   - Are you getting involved in solving problems? Are you doing the work or is someone else? Your involvement is essential.

Problems follow that students have solved using the extended model.

Example 1. One useful strategy for this problem is to break it into two parts: The two parts are separated by "AND." The problem, as it is given to students, does not have the word capitalized. An additional strategy some students have used is to use colored pens to color code appropriate parts of the graph so that they have visual cueing of what is being asked for in the problem.

PROBLEM. The graph below shows the percentage of lung cancer patients surviving longer than five years after receiving six weeks of radiation therapy in indicated dosage along with indicated chemotherapeutic agent.



What is the dosage for which Adriamycin has a higher five-year survival percentage than does Mitomycin C and a lower five-year survival percentage than does Methotrexate?

EXAMPLE 2. For this next problem, many students use a sketch to help solve it.

PROBLEM. Two athletes race around an oval track 440 yards long. One races at ten yards per second and the other at eight yards per second. How much time is required for the faster person to gain one lap?

EXAMPLE 3. This problem illustrates how useful a drawing or sketch can be for keeping track of progress through a problem. It also illustrates how introducing symbols or notation (Pup X, Pup Y) can be a worthwhile strategy. The drawing under the problem was used by one of our students.

PROBLEM. Peter owned a St. Bernard and two pups. He bought 100 pounds of dog food. The mother ate ten pounds per day and each pup ate two pounds per day. After three days one pup was sold and after seven days the other was sold. How long did the dog food last?

Day	1	2	3	4	5	6	7	8
Mother	10	10	10	10	10	10	10	10
Pup X	2	2	2	2	2	2	2	
Pup Y	2	2	2					
Cumulative Total:	**14**	**28**	**42**	**54**	**66**	**78**	**90**	**100**

Answer: 8 days

EXAMPLE 4. Some students have difficulty solving this next problem until they work an easier problem like it. A video tape we have of students "talking aloud" to help solve problems has this on it from one student: "Well, let's see--if I drove to St. Louis and back in ten hours, I would just divide the total distance by ten to see how fast I

went. So, for this problem, one way is 300, round trip is 600, total time is 12 hours--so the answer is 600 divided by 12. Right?"

PROBLEM. If a car travels five hours at 60 mph and returns over the same path in seven hours, find the average speed.

EXAMPLE 5. Recently we had a student who couldn't find what part 1/2 is of 5/6. STUDENT: I can't do this problem! TEACHER: Do you know what part seven is of nine? STUDENT: Sure, seventh-ninths, seven divided by nine. TEACHER: Can you do the original problem now? STUDENT: I've got it, 1/2 divided by 5/6. TEACHER: Yes, good for you!

EXAMPLE 6. The following problem requires very careful reading and understanding of the data given in the table. Nothing can be omitted or just skimmed over. Also, there is some superfluous information (where?). The problem statement itself takes a skilled reader to not make a mistake or a misinterpretation. It is also useful to analyze this problem in two parts (Hospital B and Hospital C).

PROBLEM. The table gives the duration of stays by patients in Midvalle's Memorial Hospitals.

Hospital	No. of Entering Patients Staying Longer Than 5 Days	% of Entering Patients Staying Longer than 5 Days	% of Entering Patients Staying Longer than 1 Week
A	53	14	10
B	42	17	8
C	60	20	12
D	75	25	14
E	80	33	20

It is true that the percentage of patients staying longer than five days at Hospital C who stay longer than one week is greater than

the percentage of patients staying longer than five days at Hospital B who stay longer than one week? (Answer: Compare 8/17 and 12/20).

EXAMPLE 7. This final problem combines two very useful strategies for solving problems: Trial and error, and a systematic way of listing all possibilities.

PROBLEM. Used kickballs cost $2.00, volleyballs cost $4.00, and basketballs cost $5.00. A combination of six balls where there must be at least one of each kind could not cost which one of the following? Show a combination of balls for each of the other three costs.

A. $18.00
B. $25.00
C. $23.00
D. $26.00

HIGHER ORDER PROBLEM SOLVING SKILLS

Since its inception in 1969, the National Assessment of Educational Progress (NAEP) has surveyed the knowledge, skills, and attitudes of over one million students. The Education Commission of States, which collects this data, reported that "today's minimum skills are demonstrated successfully by a majority of students. Higher order skills, however, are achieved only by a minority of 17-year-olds, and this proportion declined over the last decade. If this trend continues, as many as two million students may graduate in 1990 without the skills necessary for employment in tomorrow's marketplace" (Education Commission of the States, 1982, p. 2). They further noted that:

> The "basics" of tomorrow are the skills considered to be of a higher level today. These skills include:
>
> - Evaluation and analysis skills
> - Critical thinking
> - Problem-solving strategies (including mathematical problem-solving)
> - Organization and reference skills
> - Synthesis
> - Application
> - Creativity
> - Decision-making given incomplete information
> - Communication skills through a variety of modes (p. 6)

A survey of 123 school systems (Henry & Raymond, 1982) found that the basic skill of "reasoning" had the smallest percentage of school systems evaluating students as having superior preparation. Sixteen percent of the schools acknowledged that "the majority of work force-bound students were inadequately prepared to reason through complex problems and decisions" (p. 121).

Archie E. Lapointe, Executive Director of the Center for the Assessment of Education Progress, drew the following conclusion from NAEP findings (1984).

> Closer examination of the data reveals that poorly developed problem solving skills hinder students' performance in mathematics. Indeed, weaknesses exist in the so-called higher-order skills in general. Most students do well with literal comprehension but lack the skills of inference, analysis, and interpretation. Today's definition of functional literacy calls for these higher-order skills more than ever before, even as students' mastery of them is seemingly on the decline. Clearly, a renewed focus on these skills is needed. (p. 666)

As students attempt to solve more and more complex problems, the need for them to acquire higher-order problem solving skills increases. For General Motors, some of these skills are problem analysis, decision-making, and planning. Some higher-order skills listed by Piaget (1952) are hypothetical thinking, observing and discovering patterns, establishing relationships, making generalizations, and sophistication with combinatorial and probabilistic thinking. Bloom's (1956) hierarchy of

cognitive skills, described next, begins with knowledge of facts and extends to higher-order skills.

Level 1: Knowledge. The ability to recall specific facts, methods, or procedures: Terminology, facts, rules, trends, classification schemes, criteria, methodology, principles, generalizations, theories, structures. This level involves little more than retrieving stored information.

Level 2: Comprehension. The ability to make use of what is being communicated: To translate or put information in another form (restate an idea, interpret a diagram, summarize, draw a picture); to interpret or reorder ideas and comprehend relationships; to extrapolate or go beyond the given data (drawing conclusions, theorizing, predicting). This level involves understanding ideas.

Level 3: Application. The ability to apply knowledge and principles to actual situations: Generalizing to another situation. This level involves putting into action knowledge which from Level 2 has been understood.

Level 4: Analysis. The ability to classify or break material down into its components, to understand the relationships between the components, and to recognize the principle that organizes the structure or the system: To compare and contrast, to distinguish between fact and opinion, to recognize extraneous information, to recognize unstated assumptions, to compare theories. This level involves a kind of logical thinking similar to Piaget's formal operations.

Level 5: Synthesis. The ability to bring together ideas and knowledge from many sources to form new ideas, methods, or procedures: Unique communication, a plan, a set of operations, a strategy. This level involves creative or original thinking.

Level 6: Evaluation. The ability to make quantitative and qualitative judgments: To weigh, to examine, to analyze, to use criteria, to recognize the best of several reasonably good answers or solutions. This level requires the abilities of the first five levels and is crucial for substantive problem solving.

Although Bloom et al. prepared their widely accepted taxonomy in 1956 as a guide for developing and evaluating education objectives, actual classroom instruction has generally focused on Level 1 and Level 2 objectives. Bloom (1984) observed:

> . . . teachers in the United States typically make use of textbooks that rarely pose real problems. These textbooks emphasize specific content to be remembered and give students little opportunity to discover underlying concepts and principles and even less opportunity to attack real problems in the environments in which they live. The teacher-made tests (and standardized tests) are largely tests of remembered information. After the sale of over one million copies of The Taxonomy of Educational Objectives--Cognitive Domain (1956) and over a quarter of a century of the use of this domain in preservice and in-service teacher training, it is estimated that over 90% of test questions that U.S. public school students are now expected to answer deal with little

> more than information. Our instructional material, our classroom teaching methods, and our testing methods rarely rise above the lowest category of the Taxonomy--knowledge. (p. 13)

Bloom was able to cite examples of successful attempts to teach higher-order skills and he emphasized the importance of such skills for problem solving and coping with change.

> Although there is much of rote learning in schools through the world, in some of the national curriculum centers (e.g., Israel, Malaysia, South Korea) I find great emphasis on problem solving, application or principles, analytical skills, and creativity. Such higher mental processes are emphasized because these centers believe that they enable the student to relate his or her learning to the many problems he or she encounters in day-to-day living. These abilities are also stressed because they are retained and used long after the individual has forgotten the detailed specifics of the subject matter taught in the schools. These abilities are regarded as one set of essential characteristics needed to continue learning and to cope with a rapidly changing world. (p. 13)

There is no better context within which to develop higher-order skills than the context of problem solving. A bonus is that the lower cognitive levels of knowledge and understanding can also be developed via problem solving. The National Council of Teachers of Mathematics in its Agenda for Action--Recommendations for the 80's (1980) had as its

number one recommendation that mathematical content for K-12 be taught primarily in a problem-solving context.

Below, we will illustrate the need for higher-order problem solving skills for complex problems by relating an adult problem-solving session in which a problem from the General Motors manual was attacked.

THE PROBLEM: Your company has just obtained a one-year contract for delivering six truck loads of hazardous materials a month. All six trucks are enroute, and this is the first time any one of you has driven this busy road. All trucks are identical though they are loaded different. You will make 11 more deliveries this year.

The second truck is immediately behind the first truck, which is pulling a forklift. Four other trucks are about 15 minutes behind on the same road. The first truck went under a concrete underpass with no problem, but the second truck got stuck. Comparing the shipping documents you realize the first truck is carrying 400 containers weighing 50 pounds each. The second truck carries 300 larger containers that only weigh 40 pounds each. The cargo is on pallets. There is an open truck service station ahead. It has a fully equipped wrecker for servicing trucks on the highway. All the trucks must arrive at the destination 20 miles ahead within one hour or your company will have to pay penalties. There is an alternate route behind you but it is 10 miles longer with equally heavy traffic. You are members of the crew driving the stuck truck. What will you do?

The problem-solving group first agreed on a statement of their problem: How to get unstuck and arrive at the destination on time without hurting anyone. Then they looked for the cause of the problem. They assumed that they had checked for causes such as something wedged on top of the truck or mechanical failure and had found none. The problem was needing only about an inch more clearance since the truck did not collide with the underpass, but got stuck under it. They agreed that, since all trucks were identical, the lighter load of the second truck (12,000 pounds) as compared to the first truck (20,000 pounds) was the cause. The first truck had more clearance. Then they examined the resources at hand: The forklift on the first truck, a C. B. radio, $50 petty cash, the usual truck equipment (truck jack, tire tool, flares, reflectors, etc.), and the highway-class truck wrecker at the truck service station ahead. (THE GROUP WAS USING THE SKILL OF ANALYSIS IN CLARIFYING AND UNDERSTANDING THE PROBLEM.)

The group decided it was ready to brainstorm for solutions. They agreed that everyone would contribute and no ideas would be criticized or discussed during the brainstorming. The following list of possible solutions was generated.

1. Call the first truck on the C. B. Get Highway Patrol help to position the first truck behind the second truck and, using the forklift, transfer some of the load from truck 1 to truck 2.
2. Call the first truck on the C. B. The first truck would stop at the truck service station, transfer the forklift to the truck wrecker, sent it back to wait for truck 3 and load some of its cargo on truck 2.

3. Let enough air out of the tires of truck 2 to lower it one inch.

(HERE, THE GROUP WAS USING THE SKILL OF SYNTHESIS, BRINGING KNOWLEDGE TOGETHER TO ORIGINATE A STRATEGY OR PLAN.)

The group felt that it was ready to analyze the possible solution strategies. During this time, they frequently reminded each other of the problem statement and they also considered expense to the company for the immediate solution, the risk of losing the contract or paying a penalty, and the safety factor for the truck's crew. They rejected solution 1 because of the traffic hazards and possibility that truck 1 would then not make it through with less weight. Even though solution 2 would involve hiring the wrecker, it was a solution they could count on, and paying a penalty or losing the contract was financially very bad for the company. The traffic hazards still bothered them. Solution 3 was their preference for the simplicity and the time factor, but it had to be tried to see if enough air could be let out of their tires to lower the truck one inch. They finally came up with a plan which incorporated ideas 2 and 3:

1. Call ahead to truck 1, informing them of the problem and that truck 2 would attempt the solution of letting air out of the tires. Tell truck 1 to stop at the service station ahead and prepare to transfer the forklift to the wrecker.
2. Attempt to get unstuck by letting air out of the tires. If it works, inform truck 1 and call the other four trucks giving them full information about the problem they might face, the load weights involved, and the solution for truck 2. Check the

possibility that the alternate route might be feasible for them.

3. If deflating the tires doesn't work, call the service station and the Highway Patrol and arrange to load some cargo from truck 3 to truck 2 by forklift. Have the wrecker stand by at the underpass for possible problems with the other trucks.

Once the immediate strategy was determined, the group returned its attention to the long-range problem of the remaining 11 deliveries. They recommended to the company that loads be computed or the height of the trucks measured to prevent further difficulties. (HERE, THE GROUP WAS GENERALIZING A SOLUTION BASED UPON THE ONE APPLIED SOLUTION, FURTHER ANALYSIS AND SYNTHESIS.)

Problems such as this, and problems with much more complexity, are now being solved by workers. Higher order problem solving skills are "basic" for these problems, and they must be considered "basic" in pretechnical curricula. Two kinds of opportunities for complex problem solving are available for students before they enter the workforce. One is solving problems that arise naturally in the school setting. Another is solving problems provided in simulated settings.

Simulations

In simulations, students are actively involved. The student assumes an active role as a problem solver and often controls decisions and consequences that are a part of most problem solving situations. For example, in the simulation Life-Career (published by Western Publishing Co.), students must make decisions and solve problems for a fictitious person as the person deals with work, marriage, and education. Players

plan time and activities relative to school, studying, job, leisure time, and family. The game generates a universe of simulated experience that students can compare with the real world; that is, they can compare the experiences in the game to what they believe about their own world. Sarane Boocock (1968) found that the Life Career simulation increased students' factual knowledge about careers; established new relationships for students on how jobs, school, and family can be very interdependent; helped students learn that there is a causal relationship between their behavior and the outcome of events; and increased student confidence in their decision making and problem solving abilities.

The World Future Society published a directory of information resources which includes descriptions and references for 45 simulation games (Cornish, 1979, pp. 627-638). Some other resources:

- Simulation Games for the Social Studies Classroom by William A. Nesbitt (1971), Foreign Policy Association, Glenview, IL.
- Construction and Use of Written Simulations by Christine McGuire, Lawrence Solomon, and Philip Bashook (1976), The Psychological Corporation.
- Simulation Games in Learning by Sarane Boocock and E. O. Schild (1968), Sage Publications, Beverly Hills, CA.

Good simulations require most of the essential moves of successful problem solvers: Gathering data, selecting alternatives, conducting analyses, synthesizing, generalizing, making decisions, planning, and taking action. According to William A. Nesbitt (1971), simulations teach students to think critically, examine alternative strategies, and to critique their own decisions and behaviors. Simulations provide an

opportunity for students to solve substantive problems and to gain confidence in their abilities to tackle problems, wrestle with them, and by progressing a bit at a time, eventually solve them. An example of a simulation for solving office-related problems follows.

You are a member of an office staff for a company whose president made a decision to trade in all the existing office equipment and replace it with a system of equipment from one company. The office staff was asked for input on such matters as new procedures, workflow, job responsibility, training for use of new equipment, and guidelines for implementing the new procedures. Nevertheless, after working in the new setting for six weeks, some problems have arisen with job satisfaction and the staff is meeting to search for solutions. You are one of the following staff members.

° Sandra Miles was Mr. Hamblin's secretary. Her duties were to keep his calendar, take his calls and serve as receptionist for his callers, process all his paperwork and retrieve information from his files. Her new title is "office manager." She is now responsible for directing the work flow from all the executives. Since there was no cross-training, she is unable to retrieve information when Don, the information processor, is gone. Sandra also supervises all the work of the office staff. She is beginning to feel that she lacks supervisory skills. She is also frustrated about the pressure to resolve problems which have arisen with the rest of the staff, and that is the reason she has called this meeting.

° Don Fieldman was Mrs. Logan's secretary. His duties were similar to Sandra's. Don's new title is "information processor." He was eager to be trained on the new equipment and is enjoying the challenge of problem solving for what the equipment could do for his work load. But Don is having problems with his back and his eyes. He complains of the glare on the screen. In addition, his equipment was placed in a small room adjacent to the main office and he misses the contact with the rest of the staff.

° Charlene Henry was moved from her job as clerk/typist to that of receptionist. She takes all incoming calls on the switchboard and receives clients. She is having difficulty with retrieving information for customers and dealing with their irritation when they feel that they are being slighted.

° Mason Tyler was the clerk/typist who was primarily responsible for the filing system. His new position is "records clerk" and he has full responsibility for storage and retrieval of records. Like Don, he misses contact with the rest of the staff, but also is running into problems with the increased flow of paper resulting from the new system. Another problem is that no system has been identified for filing information stored on disks. Mason feels pressured to respond efficiently to requests for information.

Your staff meeting has begun, and the entire staff has agreed that the office environment is "depressing" and that these unresolved problems are beginning to cause friction. Your group has agreed to use a five-step model for problem solving: 1) identify, understand and prioritize the problems, 2) brainstorm for solutions, 3) select tentative solutions, 4) determine how to

implement the solutions (who does what, when), and 5) discuss what people have learned about themselves individually and as a group. The staff has also agreed to set a date for re-evaluation of the solutions.

You are a member of the office staff--proceed with the problem solving!

INTERPERSONAL SKILLS FOR BEING EFFECTIVE WITH INDIVIDUALS AND IN GROUPS

Interpersonal skills are critical for problem solving, and they have been identified as highly desirable by employers. A very recent study, Perspectives on Vocational Education (Chicago United, 1984), found that 94% of 995 employers cited the ability to work with others as the interpersonal skill they most wanted in their workers. One of the conclusions from a survey of 593 secondary vocational training teachers in 32 vocational training program areas (Greenan, 1983) was that "all interpersonal relations skills are very important for success and highly generalizable across all program areas and programs" (p. 57).

Considering the importance placed on interpersonal skills by representatives of business and industry and by vocational educators, they should be part of a pretechnical curriculum. This section of the paper describes specific interpersonal skills which can be learned and guidelines for group problem solving, including an extension of the Five Step Model which incorporates the specific interpersonal skills described below.

SKILL: Awareness of Self and Others

Verbal communication skills can be learned, but a person may be regarded as insincere or robot-like if the skills are thought of as tools to "use" on other people. A very important part of instruction in interpersonal communication is awareness of personal needs and values and also the needs and values of others. Only then will new behaviors become comfortable and natural habits of communication. The important

changes are in how one views oneself and others. The verbal skills will follow with practice.

Values

Some experts believe that most values are acquired by the time a person is about ten years old. Young people are influenced by parents, peers, teachers, and "heroes." Their values reflect what they have learned about right and wrong, good and bad, from interactions with people and lessons from other parts of their environment. Morris Massey presented this point of view in The People Puzzle (1979). He explained that although significant emotional events can produce a change in values, people generally maintain those early values throughout their lives. So if one looks at a cross-section of the population, different values legitimately exist. Consider, for example, values differences between those people who were ten years old during World War I and those who were ten years old during Watergate. Massey gave an example of a factory foreman who realized that working overtime was a penalty for his younger workers, but a reward for his older workers. In getting along with other people, it is important to accept that their values are different rather than to label them as wrong. In problem solving situations, solution strategies which conflict with people's basic values will probably not be effective. For example, people who value their health more than their financial status will not be highly motivated by higher pay to be more productive if unhealthy working conditions exist.

Needs

Most dissatisfactions with people and with situations are the result of one's needs not being met. Some basic needs are security,

belongingness, love, and aesthetic fulfillment. But each person has a unique set of needs which might include, for example, a need to feel important, a need to dominate others, a need to be a follower, a need to have one's way, a need to have others in one's debt, etc. Sometimes people find it difficult to put their finger on what is bothering them about a situation. If they could identify which of their needs are not being met, they would be more likely to be able to find reasonable solutions. One very important need for most people is to feel adequate, and when their adequacy is threatened, they tend to behave irrationally. Sensitivity to one's needs and the needs of others is an interpersonal skill of great importance.

Feelings

Awareness of one's own feelings and sensitivity to the feelings of others is absolutely necessary before knowing how to respond to another person effectively; that is, so that communication does not damage the relationship. In general, feelings fall into four categories: Mad, Glad, Sad, and Afraid. Activities exist for helping people to recognize a range of feelings within each category. A simple example of an activity is to simply list as many feelings as possible. In order of decreasing intensity, some feelings under Afraid are: Panic-stricken, terrified, frightened, threatened, alarmed, worried, anxious, bewildered, uneasy, confused, unsure. As will be explained in later sections, sensitivity to feelings is necessary both for effective listening and for being assertive.

SKILL: Recognizing Problem Ownership

Good interpersonal skills are useful in most situations where two or more people interact--at home, at work, or in social or recreational

settings. They are particularly important, however, when someone is upset. It is difficult to function efficiently with feelings of sadness, frustration, helplessness, etc. If one wants to facilitate communication at such times rather than block communication, it is necessary to recognize which person is having negative or uncomfortable feelings--oneself or the other person. The question, according to Thomas Gordon (1974) is, "Who owns the problem?" The answer to that question determines which interpersonal skills are the most useful for effective communication. When the other person is upset, listening skills are important. When you are upset, the skills to be aware of are assertive statements and self-disclosure statements. These skills are described in later sections. Here are some examples of problem ownership:

Suppose a teacher or a manager or a supervisor perceives any of the following <u>from</u> a student or a worker:

- discouraged about personal progress
- failing to meet a performance standard
- depressed about a death in the family
- not being accepted by peers
- having a conflict with peers
- not being able to compete with more talented peers

It is the student or the worker who "owns" the problem. The negative or uncomfortable feelings belong to the other person, and good listening skills are needed.

On the other hand, suppose a teacher or a manager or a supervisor is faced with any of the following from a student or a worker:

- not completing work

- borrowing something and not returning it
- being habitually late
- not following instructions
- being destructive with equipment
- concealing information
- refusing to cooperate
- ignoring important procedures

In cases like these, very likely the teacher (manager, supervisor) will feel upset and will recognize that he or she "owns" the problem. Skillful assertive statements will be useful here.

SKILL: Avoiding Roadblocks to Communication

Certain kinds of responses are not facilitative when another person is upset or angry. Thomas Gordon (1974) called them "roadblocks." Some of them might be all right when no one "owns a problem," but when someone is upset in any way these responses may block communication. They can convey lack of interest, not wanting to listen, or not understanding what the person is saying and feeling. Roadblocks can convey many negative messages: The person is not a competent problem-solver, the person needs to be led, or the person just is not very bright. These messages can be damaging to a person's self-esteem and to relationships between people. The skill is to understand how roadblocks inhibit communication and to cease using them.

Roadblocks to Communication

Directive Responses

These carry a hidden message that the other person's feelings or point of view are not being considered--that there is no interest in

listening and the situation is to be disposed of in the quickest and easiest way: By telling the other person what to do.

1. Ordering, commanding, directing

   "Stop complaining about the system and concentrate on doing the best work you can."

   "Don't keep making excuses. Just get the job done."

2. Warning, threatening

   "If this situation doesn't improve, I'll have to settle it for you and you won't like my solution."

   "If you don't start reading the assignments, I'll give a quiz at the beginning of every class."

Solution Responses

These are attempts to solve other people's problems for them. So what's wrong with giving advice? First of all, a person who is upset most likely will not even hear the advice. Second, advice is generally given from one's own perception of the other person's needs and that might not be the same as the other person's perception. Roadblocks usually address other people's apparent problems rather than their real problems. By jumping in with advice, the focus of the conversation is taken away from the person with the problem. Advice is O.K. if requested or when the other person is no longer experiencing upset feelings.

3. Advising, offering solutions or suggestions

   "Why don't you give up the weekend job and spend more time with your family?"

   "All you need is more confidence in yourself. Tell yourself you can really do it."

Persuasive Responses

Persuasive responses are attempts to persuade other people to change their feelings, thoughts, or behaviors. Guilt, shame, and intimidation are sometimes the hidden persuaders. A person who is upset wants to have their feelings understood, not denied.

4. Moralizing, preaching, giving "shoulds and oughts"

   "You shouldn't feel guilty about turning someone in. You have a responsibility to the whole group."

   "If you didn't vote, you shouldn't complain about the outcome."

5. Teaching, lecturing, giving logical arguments

   "It's very unlikely that your son is in trouble. Most runaways don't go very far, and they usually come home when their money runs out."

   "If I gave you an extension, then I'd have to give other people an extension also."

6. Reassuring, sympathizing, consoling, supporting

   "Oh, it's not all that bad. Everything will look better in the morning."

   "Sure, you can do it. You always come through in a crunch."

Evaluative Responses

These responses involve a negative or a positive judgment. The other person's actions are evaluated rather than objectively observed. Evaluation can be a legitimate function of a supervisor, a teacher, or a peer in a "problem-free" situation, but it is not effective when someone is experiencing unpleasant or uncomfortable feelings or is really down.

7. Judging, criticizing, disagreeing, blaming

   "You just aren't putting any effort into your work."

"If you'd plan ahead, you wouldn't have all this to do at the last minute."

8. Name-calling, stereotyping, labelling, ridiculing

"All right, Mr. Know-It-All."

"That's the way losers talk."

9. Praising, agreeing, giving positive evaluations

"With as much common sense as you have, I'm sure you're going to handle this perfectly."

"You wouldn't intentionally do anything to hurt anyone's feelings. You're the kindest person I know."

10. Interpreting, analyzing, diagnosing

"You may think you don't want that job, but I think you really do. You're just afraid that you'll be turned down and you don't want to rush into it."

"You're just acting that way to get attention."

Avoidance Responses

These responses are designed to avoid communication about the other person's problems. They convey disinterest or unwillingness to carefully listen.

11. Withdrawing, distraction, being sarcastic, humoring, diverting

"Let's talk about something more pleasant."

"You're making a mountain out of a molehill."

"Come on, let's see a smile."

"You think you've got problems? Let me tell you about what happened to me today."

12. Emphasizing your own needs

"Just think about the position that puts me in."

"I can't do anything about that. I set that deadline three weeks ago so this wouldn't happen."

"That's all I need right now is to start getting a lot of flack from you."

Questioning Responses

Questioning is a very common response. The impulse to ask questions is so ingrained in adults that they are seldom even consciously aware of the purpose of their questions. It is important to be aware of the negative effects questions can have on someone who is experiencing a problem. A good analysis of types of questions, their purposes, and their effects appears in Wittmer and Myrick (1974), Facilitative Teaching: Theory and Practice.

13. Questioning, probing, interrogating, cross-examining

"What made you think you could get away with it?"

"Why are you getting upset?"

"Do you still put everything off until the last minute?"

Interrupting

Interrupting is a major non-listening response and a very common one.

14. Interrupting, interjecting, rushing

"But, don't you see . . ."

"Yes, but . . ."

(Nonverbally shaking head "no" while other person is talking)

SKILL: Listening

When one has identified the other person as "owning the problem," good listening skills are needed. Very few adults have any training in listening skills and they are perhaps the most important skills in interpersonal relations. The first step is to be sincerely committed to hearing what the other person is saying and feeling. There should be a concentrated effort to focus on the other person's thoughts and feelings and not to inject one's own agenda into the interchange. There are many increasingly skillful listening responses one can give, and each step up makes the other person feel more that they are being not only listened to but also understood.

1. Encouraging the Other Person to Talk

Silence. This first step is indeed a skill requiring practice. It requires committing oneself to focus on nothing else but the other person. It is a skill seldom practiced at social events where most people's minds are usually on what they are going to say next and where a lot of interrupting and "posturing" occurs. Communication is usually enhanced by allowing people time to collect their thoughts or perhaps to gather courage to express their thoughts and feelings.

Nonverbal Encouragement. Your body can convey that you are interested in listening. Eye contact conveys that you are being attentive. Turning to fully face the other person is a message that you are giving your full attention. If you were reading or writing, you can close your book or put your pencil down. Be aware of the physical environment. Move out from behind your desk or position yourself so that there is no physical barrier between yourself and the other person. Nodding your

head at times can mean, "Yes, go on, I'm listening." A side-to-side movement can mean, "I'm sorry to hear that" or "That's too bad."

Verbal Encouragement. Very simple statements can encourage a person to talk. "I see," "un-huh," "oh, no!" "wow!" Sometimes more direct encouragement is called for, particularly if the other person is silent for a long time. "Would you like to talk about it?" "Go on," "I have some time right now if you'd like to talk some more," "Do you have time to talk about it now?" "I'd like to hear more about that." "How did you feel about that?"

2. Responding by Reflecting Meaning

When the other person "owns the problem" or is upset, encouragement to keep talking is important, but there comes a time when the listener wants to say something that is helpful.

Paraphrasing. One very effective listening response is simply to reflect back what was said. This leaves the ball with the speaker and gives evidence that listening occurred. It also gives the other person a chance to "hear" what he or she has been saying. It would sound awkward to simply repeat or "parrot" the other person's words, so try to paraphrase so that it sounds natural.

- Other person: I can't stand the way Jones keeps pacing up and down.

  Parroting: You can't stand the way Jones keeps pacing up and down!

  Paraphrasing: Jones' pacing really bothers you!

- Other person: I just don't know how to keep those two people from monopolizing the meeting.

  Parroting: You don't know how to keep those two from monopolizing the meeting.

Paraphrasing: Getting everyone involved is tough when those two talk all the time.

Clarifying, Confirming. Sometimes it is difficult to understand what a person is saying because some crucial information is missing. It can be helpful to ask for more information to clarify what has been said or to confirm that it has been understood.

"If I understand you correctly, you tried to explain your actions, but she wouldn't let you. Then it was after that that you wrote the letter."

"When did all this take place?"

Questions should not be probing and "why" questions should be avoided. For example, "Why do you think he was angry at you?" might be a roadblock to communication. Roadblocks must not be used.

3. Responding by Reflecting Meaning and Feelings

The term "Active Listening" is widely used for the kind of listening which reflects not only meaning but also feelings. Listening for feelings is the key to being empathic. Almost everything a person says is preceded by and is the result of some internal thought or feeling they have. Those thoughts and feelings are encoded into verbal messages and what people say usually is not an exact translation of what they are thinking or feeling. Even a message that sounds very direct like, "You're standing on my foot," really means, "Move! Get off my foot!" Most social beings have some skill with decoding the meaning of verbal messages. It is a rare person who would take literally the question, "How many times have I told you not to slam the door?" The meaning and the feelings are clear: "I'm irritated because you slammed the door!" Through awareness and practice the skill of Active Listening can become

a natural and highly facilitative communication tool. Notice how feelings, as well as meanings, are reflected in the following example of an adult educator's Active Listening skills.

STUDENT: (angrily) Well, here's my project. I hope you like it because it took a lot of work, but I only did it because it was required!

TEACHER: The project was a waste of time for you. (REFLECTING MEANING)

STUDENT: Real busy work! I have better things to do with my time!

TEACHER: You really resent the time you spent on this. (REFLECTING FEELINGS--resentment)

STUDENT: Yes! (pause) Well, it was interesting and I did learn some things. It's just that I can't do this kind of thing in my classroom. My kids would go wild at first and the principal would have a fit.

TEACHER: You wouldn't mind trying it but you're a little afraid of what might happen. (REFLECTING FEELINGS--fear or apprehension)

STUDENT: You bet! In my school, it's a real risk just to put the desks in a circle! Sometimes I wonder why I even bother to take classes and learn new ideas.

TEACHER: I guess it can be really frustrating at times. (REFLECTING FEELINGS--frustration)

In this example, the student was angry and the teacher could have "bought into" the student's problem and responded defensively with a Roadblock like, "Well, if you remember, I told the class to see me individually if anyone had problems with the assignment. You should have done that." Then the conflict could have escalated. Or, the teacher could have dismissed the student's feelings with, "Well, I'm

sure it's a very good project. Sooner or later, you'll appreciate having done this." That could have ended the conversation with the student "turned off" and thinking that the teacher didn't understand and didn't care. Instead, the teacher was alert that the student had a problem. The teacher relaxed and listened to the student's anger, reflecting back meanings and feelings. Two things happened: (1) once the angry feelings were out, the student calmed down, and (2) the real problem came out--not anger at the teacher for requiring the project, but frustration with a restrictive school system.

Active Listening serves many purposes in interpersonal communication, and it is an additional skill to be aware of one's objective when listening. Some points for awareness:

- Dealing with anger. When another person "blows up," it is particularly important for the listener not to react to the precise meaning of what was said, because the angry words most often screen the real problem. If the listener reacts defensively, the listener is focused on self-protection and is not hearing the real problem. It is more useful to encourage an angry person to keep talking than to give put-downs, to argue, or to give rebuttals. With Active Listening, angry feelings subside and are diffused. The real problem usually emerges and the screened feelings become apparent: Sadness, frustration, resentment, etc. The listener might then feel a need to deliver a self-disclosure message; for example, "I do not like to be called names," but such messages are not heard or processed as long as the other person is upset.

- Facilitating problem solving. One must not expect that Active Listening will solve other people's problems for them. Rather, it helps other people to clarify problems for themselves, to assume responsibility for their feelings and actions, and eventually to find their own solutions. Active Listening is also an invaluable skill in group problem solving for clarifying and understanding the individual needs that must be considered when searching for a successful solution strategy.

- Support and rapport. Active Listening is not just for intense or explosive situations. Feelings underlie most of the verbal and nonverbal messages people send to one another, and this is particularly true in the classroom or in the workplace where pressures and fears about learning, competence, acceptability, and control exist for both teachers and students, for both managers and workers. Good listening is contagious and skilled individuals can contribute greatly to the kind of cooperative atmosphere which enhances productivity and the quality of people's personal and occupational lives.

SKILL: Assertive Statements

Listening is important when another person is upset. But when people recognize that the upset feelings belong to them--that they "own the problem"--it is equally important to communicate in a nonthreatening manner. The skill is assertiveness.

Being assertive is somewhere between being aggressive and being passive. Aggressiveness involves trying to get one's own needs met at the expense of someone else's needs. Passivity involves meeting other

people's needs at the expense of one's own needs. Assertive statements do not put the other person down and do not blame or criticize. Compare these statements.

Aggressive: You people don't know what you're doing! This is the second time I've brought this coffeemaker back and it still doesn't work right. If you don't fix it I'm going to write to the president of the company.

Passive: I'm terribly sorry to bother you again, but this still isn't working right. Do you think you could look at it again?

Assertive: There's a problem with this coffeemaker. Repairing it doesn't seem to solve the problem, so I'd like a replacement. . . . No, I don't have any more time to spend on bring it in. I'd like a replacement, please.

I-Messages

One kind of assertive statement is called an "I-Message." Its purpose is to maximize the probability of the other person choosing to change the behavior that is interfering with one's needs. It consists of:

- An objective description of the behavior
- The tangible effect of the behavior on the speaker
- The speaker's feelings
- The preferred behavior or expectation

A substitute teacher found the following I-Message to be effective: "When there's a lot of talking in here during reading (OBJECTIVE DESCRIPTION OF BEHAVIOR), it makes it difficult for me to hear students in the reading group (TANGIBLE EFFECT), and I get frustrated (FEELINGS). It

would help me a lot if you would whisper or not talk at all while you work (PREFERRED BEHAVIOR)."

The significance of the "I" in "I-Message" is that the upset person is "owning" the problem. When "you" creeps into the message, the other person tends to become defensive, because "You-Messages" usually come out as judgmental Roadblocks. I-Messages can enhance communication by clarifying the nature of the problem without attacking the other individuals involved.

PROBLEM SOLVING IN GROUPS

Problem solving in groups is now emerging as an important part of the work world for all levels of employees, not just managers (Pratzner & Russell, 1984). Many companies are involving workers in diagnosing problems and implementing effective solutions. These organizations have implemented programs called "Quality Circle Programs," of which one important element is the Quality Control Circle. Very briefly, Quality Control Circles have these things in common. Size: Preferably five to ten members. Volunteerism: Freedom of choice to join. Meetings: One hour weekly, with exceptions. Skills: Brainstorming, cause and effect analysis, data collection, effective planning.

Japanese industrialists have been using Quality Control Circles since 1960. As many as 11 million workers are involved in the Quality Circle movement throughout Japan, and industries in all of the world's industrialized countries have shown interest in implementing the process. The Lockheed Company's Missile and Space Division was the first United States organization to put the concept into action in 1974 and a $500,000 investment in the program resulted in an estimated savings of $3 million (Lloyd & Rehg, 1983).

The National Center for Research in Vocational Education listed organizations in the public sector which have implemented employee participation groups (Lloyd & Rehg, 1983). Among these are the U.S. Air Force, the U.S. Army, the U.S. Navy, and the Federal Aviation Administration. Also listed were 162 organizations in the private sector. Among these are such major companies as Bendix Corporation, Firestone, G. E. Major Appliances, General Foods, General Motors, Hewlett Packard,

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Hughes Aircraft, J. C. Penney, McGraw-Edison, Polaroid, 3M, Union Carbide, Uniroyal, and Westinghouse.

Not only are Quality Control Circles advantageous for productivity in business and industry, they are very effective for problem solving in any organization. Lloyd and Rehg (1983) gave an example of effective use of Quality Control Circles by school districts.

> . . . a midwestern school district has used the QC process to solve problems that resulted from declining enrollments and escalating costs (Rehg, 1982). Ten quality circles made of administrators, faculty, staff, and citizens met to develop solutions which were then compiled and distributed to the ten groups. Consensus was reached, and the proposed solution was then presented to the public for review. The school board adopted the solution essentially as proposed by the quality circles. No complaints were received nor were any grievances filed despite the facts that some teachers were reassigned and some terminated, and that some schools were closed. In contrast, the school board in an adjoining district facing a similar problem made a unilateral decision to close certain schools. In response, a citizen's group filed a lawsuit in an attempt to block the closing.

Pratzner and Russell (1984) have delineated the skills, knowledge, and abilities needed for high-involvement participative work settings (pp. 12-13). Under the skill area Group Problem Solving they list eight sub-categories: Interpersonal Skills, Group Process Skills, Problem-Solving Skills, Decision Making, Planning, Communication, and

Thinking/Reasoning. The specific skills for two of these categories are given below.

Interpersonal Skills

- Self-directed
- Flexible
- Assertive
- Open
- Curious to learn
- Able to share/teach
- Responsible
- Understanding of behavior

Communication

- With individuals
- With groups
- Presentation skills
- Verbal skills
- Writing skills
- Listening skills

The General Motors Employee Participation Groups Member Manual (Kolb & Baker, 1980) is used to train employees to be effective group members. Many of the skills the employees learn are interpersonal skills. Some examples:

> Involving Others. You may notice some people getting quiet during a meeting. They may have information or ideas but may be reluctant to break into the discussion. You can "invite" them in. Example: "John, we haven't heard from you yet. What do you think?"

Give Credit--Avoid "Put-Downs." If you borrow another's idea or add to it, give them credit for the basic idea. If you don't like another's idea, avoid criticizing the person. Example: "Mary's idea of using the scrap is a possibility. I like it better than not using the scrap." (Not using the scrap was Paul's idea.)

It is not sufficient for successful group problem solving for a person to be adept at problem solving strategies without also having good interpersonal skills. Unlike individual problem solving, group solution strategies are usually arrived at through processes which require listening, empathy, cooperation, and concern for everyone's needs.

Five Step Model for Solving Problems Resulting from a Conflict of Needs

The Five-Step Model is highly adaptable to group problem solving, whether mutual problems exist for only two individuals or for a group. Some problems center around a Conflict of Needs. That is, the needs of one or more persons are not being met, and a change in the behavior of the other person or persons is necessary to solve the problem. In such situations, the specific interpersonal skills described earlier are necessary, particularly at the first step, as shown below.

1. Understand the Problem
   - One person initiates the process by giving an I-Message.
   - Often, the other person(s) will be defensive or will unveil their own related problems, so the first person must reflect

meaning or actively listen in order for the real problem(s) to be identified. Avoiding roadblocks is critical at this point, particularly if the sharing becomes emotional.

2. Brainstorm for Possible Solutions
   - Suggestions are not to be evaluated, and a skillful person encourages others to contribute ideas.
   - Self-knowledge is important for resisting tendencies to interrupt, to put other people's ideas down, or not to be open to new ideas.
3. Choose a Tentative Solution
   - Although compromise is sometimes necessary at this stage, the needs of both or all people must be met as best as possible. Assertive statements are important if one feels that a solution is not good for all the people involved, particularly for oneself.
   - Active listening is useful for helping others clarify their positions about possible alternatives.
4. Carry Out the Tentative Strategy
   - It is important to decide "Who, does What, When."
   - A very specific time should be set for evaluating the solution, which should be considered a trial solution, perhaps the first of several attempts to meet everyone's needs.
5. Learn
   - As new procedures, routines, or behaviors are attempted, look for opportunities to increase self-knowledge. If the

solution is not working, this is the time to look more closely at your real needs. Perhaps the problem, as you saw it, was not the real problem for you. Maybe you need to change what you are doing. Maybe the environment needs to be changed.

° Evaluate the effectiveness of the solution. The process might need to be repeated, from steps 1 through 5.

Thomas Gordon (1974) calls this process the "No Lose" problem solving method. In most interpersonal problem solving one person "wins" and the other "loses." Examples are: Authoritarian classrooms where teachers "win" and students "lose" or permissive classrooms where students "win" and teachers "lose." Analagous situations occur in business and industry when management and labor become involved in power struggles. The objective of the Five Step Model is to resolve conflicts or to solve problems so that everyone gets some of their needs met.

An example of the No Lose process was given in the diary of one of our students, a teacher who was learning new interpersonal skills and applying them in her classroom.

> There has been a situation in my classroom in which students are absent for a day or several days and don't make up the math assignments they missed. Then when I average up grades at the end of the nine-week period, some students don't have all the grades they should and their grade average is lowered. I decided to discuss this situation with my students to see if we could reach an agreement on this matter. This is how the situation went:
>
> Teacher: Class, I think we need to discuss the matter of not making up math assignments after being absent. When the assignments are not made up, I have to explain to your parents why you math grades are so low, and this is really embarrassing and annoying to me. I would prefer that you make up the assignments, but students haven't been doing so. (I-MESSAGE) I'd like to know how you feel about this situation.

Steven: I don't know which pages I missed. You told me what assignments I had done, but I forgot what they were before I had finished all the assignments.

Scott: I didn't understand all of the assignments, so I didn't do the ones I couldn't do.

Teacher: Some of the assignments you didn't do because you didn't know how to do them. (REFLECTING MEANING)

Scott: Yeah, I guess so.

Steven: I could have finished all of mine if I knew what all the assignments were. I asked some of the other students, but they didn't know.

Teacher: You didn't know what some of the assignments were, so you didn't do them. (REFLECTING MEANING)

Steven: Yes.

Sylvia: We don't have time to catch up on assignments when we've been absent. We have math work every day, and if we finish that, there's not much time left for working on other assignments.

Teacher: You're saying that lack of time is preventing you from getting all your assignments done. (REFLECTING MEANING)

Sylvia: Yes.

Veronica: We have to catch up on all our other assignments that we missed too. I just can't get it all done, especially when I've been absent two or three days.

Teacher: Veronica, you also think that there is not enough time to get your assignments done, especially when you have to also catch upon work missed in other classes. (REFLECTING MEANING)

Veronica: Yeah, but I know we have to do our math assignments in your class too.

Several other students voiced similar opinions about why math work that was missed when they were absent was not made up. After a few more minutes of students expressing their feelings and my Active Listening to them, I summarized our problem: "Well, it looks like the problem for me is people not making up assignments after being absent and my having to give lower grades because of the missing work and explaining this to your parents. You are saying that you don't always know what the assignments are, that sometimes you don't know how to do them because you missed the explanations when you were absent, and when you come back, there is

a lot of work to be made up from all your different classes." (UNDERSTANDING AND SUMMARIZING THE PROBLEM - end of Step 1.)

I then asked for suggestions on how we could solve this problem. (BRAINSTORMING - Step 2.) I wrote the suggestions that were given on the board. They were:

1. Give students a zero if they haven't got the assignment done within a week after they come back to school.

2. Make up a folder for each child and put in it any assignments that the person needs to finish. Teacher would explain any work that the child doesn't understand.

3. Send work home by another student or the absent student's brothers or sisters.

4. Let students work in class on the assignments they missed while everyone else is doing the regular assignment for the day.

5. Call their parents and tell them when students don't make up assignments so they can be expecting them to have a low math grade.

Each solution was then discussed to see why or why not it would be a good solution to our problem. (CHOOSING A TENTATIVE SOLUTION - Step 3.) Most didn't like getting a zero for not completing work. Neither did they like the idea of calling their parents about missed assignments. Many students thought that sending work home by brothers and sisters wasn't good because sometimes it was hard to find them and give them assignments and they may forget to give it to them when they got home. I didn't like the idea of students working in class on missed assignments because then they would miss the work scheduled for the day, and they would be even farther behind.

We talked about solution 2 and everyone felt it was a good one, but a time limit should be set on handing the folders back in with the assignments completed (a week was designated). So we decided to try it. Students would make their own folders, and the teacher would put missed assignments in them. A person who didn't do his assignments would have a conference with the teacher to see what the problem was. A student who lost his folder would be responsible for making a new one and finding out from the teacher which assignments needed to be completed. (CARRYING OUT THE TENTATIVE STRATEGY -- "WHO DOES WHAT, WHEN" - Step 4.)

Students are getting work done in their folders and getting them back so far. There has been no instance of lost folders yet. About two or three people have not been able to finish their assignments within the week limit, especially when they have been out of school for several days, but I have asked the class if it is okay to give them a time extension, and they agreed.

> I really like that students are trying to get assignments done because they know that they had a part in making this decision, and they are trying to be more responsible for turning in their work. (LEARN - Step 5.)

This kind of process is used in business and industry when Quality Control Circles engage in group problem solving and the results have been impressive. Lloyd and Rehg (1983) gave examples of the outcomes of some of these group efforts.

- A Quality Control committee suggested a procedure which was initiated by the Purchasing Department at Westinghouse Electronics Systems Center in Baltimore, Maryland. By returning overshipments to vendors at their own expense, an estimated $636,000 was saved.
- Management of a General Motors plant in Tarrytown, New York was considering closing the plant down because of high absenteeism and poor product quality. The number of outstanding employee grievances against management totalled two thousand. Since Quality Circles began to hold meetings to discuss complaints and ideas for boosting efficiency, the number of outstanding grievances has dropped to thirty, and absenteeism has been reduced to 2.5 percent.
- At the Lockheed Company, a Quality Circle developed a method to mold a plastic part assembly in two instead of five steps. The redesigned assembly is lighter and stronger than its predecessor, and has resulted in an estimated savings of $160,000 over the life of the contract. Since 1974, Lockheed's savings from its Quality Control program are estimated at almost $3 million, six times the cost of operating the program.

The Need for Interpersonal Skills for Negotiating

Whether between individuals or in groups, interpersonal skills are central to successful negotiation as described be Fisher and Ury in their 1983 best-seller, Getting to Yes: Negotiating Agreement Without Giving In. Negotiations occur in everyday life, as when a person returns a defective product and needs a settlement or when price differences must be resolved. In more formal negotiating processes, individuals represent constituencies and negotiating sessions are sometimes hard-hitting encounters, even to the point of using "dirty tricks." Fisher and Ury, however, advocate an approach that consists of skillful interpersonal interactions combined with assertive skills. Some of the skills they mention are awareness of one's feelings, active listening, and I-Messages. ". . . human beings . . . are creatures of strong emotions who often have radically different perceptions and have difficulty communicating clearly. Emotions typically become entangled with the objective merits of the problem. . . .Figuratively if not literally, the participants should come to see themselves as working side by side, attacking the problem, not each other" (p. 11).

Conclusion

It is clear that the American workplace is placing increasing importance on employee problem solving and that interpersonal skills are needed to be effective in problem solving groups. In addition, most citizens are involved in several groups in their daily lives--in classes they take, in PTA's, in social groups, in church groups--and the quality of their participation would be enhanced by being more skilled interpersonally. That is sufficient evidence to consider interpersonal skills

"basic" and to seriously consider where and how they should be taught in the pre-technical curriculum.

There is a need for a formal curriculum for problem solving skills. Skills must be studied, analyzed, and practiced. At the same time, teachers should acquire these skills themselves so that they will be effective models for students. Active involvement in actual problem solving is invaluable, and this should occur at all grade levels. Here are some examples from our observations.

> We observed a high school biology class in which the problem of too much noise during lab periods was solved by the students in such a way that they monitored themselves and increased their productivity.
>
> We observed the faculty advisor for a high school yearbook use the Five Step Method with a Cooperative Education student who was habitually late to yearbook meetings because of a part-time job. Their mutual solution was to have another student fill the student in with information that was missed because of being late and which was needed to do his job.
>
> We observed a fourth grade teacher facilitating a rule-setting session during the first week of school. Class rules were determined to satisfy students and the teacher, and consequences were agreed upon.
>
> We observed a first grade teacher deal with two students who were disputing the ownership of a red felt pen. She directed the students to go out in the hall, settle the matter, and report their solution to her. They did.
>
> We observed a first-grade teacher patiently sitting by a child who was learning to put the papers from his messy desk in order. The child was learning to make decisions and to be responsible. The teacher said nothing except to occasionally ask, "Does that paper go home or will you throw it out?" The child made the decisions.

Teachers must be prepared to facilitate problem solving whenever the opportunity arises. Such learning experiences with "real" problem solving will be remembered by students above all others.

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APPENDIX

Facilitative Communication

This section is an elaboration of previous ideas about listening skills. It could be used for instructional materials to teach listening skills to teachers. The materials include exercise sets and an answer key.

FACILITATIVE COMMUNICATION

Facilitative teachers help students grow, change, and learn. They view themselves as freeing students rather than controlling them. They have developed interpersonal skills of empathy, genuineness, and positive regard for other people. They view their students as individuals worthy of trust and respect. They try to create a nonthreatening atmosphere in which their students may be able to feel good about themselves and consequently be able to learn.

Many teachers hold such attitudes and yet fail to be facilitative teachers. The problem is that attitudes toward students are useless unless students perceive the teacher as possessing these attitudes. These perceptions are strongly influenced by the way the teacher responds to students. One only has to observe students for a short time to see them acting out feelings and trying to communicate feelings to the teacher and to other students. Teachers' responses at such times are vitally important for students' personal and academic growth.

Everything teachers say or do communicates something to students. Even silence has a "message." Certain ways of responding to students block student-teacher communciation, while other ways facilitate student growth and strengthen relationships between teachers and students. In this chapter, both effective and ineffective communication characteristics are examined.

Facilitative communication skills can be learned through awareness and practice. They are not merely verbal techniques and stock phrases to be used to control students. There are important purposes behind communication skills, and these purposes reflect the role of a teacher as a facilitator of growth and learning.

Purposes of Facilitative Communication

1. To establish an atmosphere in which learning can take place
   - *To remove fear and threat
   - *To communicate an openness to all thoughts and feelings, negative or positive
   - *To transfer responsibility for learning from teacher to student
   - *To encourage cooperation and success
   - *To nurture feelings of self-worth

2. To strengthen student-teacher relationships
   - *To communicate caring about students' thoughts and feelings
   - *To communicate that students are trusted
   - *To communicate respect for students' judgements and opinions
   - *To communicate respect for students as worthy individuals

3. To foster students' personal growth
   - *To enable students to make their own decisions
   - *To encourage students to express their feelings and thoughts
   - *To lessen dependence on the teacher as a problem-solver
   - *To enhance students' self-regard and feelings of worth
   - *To encourage student awareness of self
   - *To encourage students to try

FEELINGS CAN INTERFERE WITH LEARNING

Think about times when you were having difficulty learning. Did you ever say to yourself or to others, "I just can't concentrate," or "I don't feel like studying," or "I can't think straight right now?" Maybe you felt angry, sad, embarrassed, rejected, afraid, apprehensive, or resentful. Were you able to learn then? At other times did a teacher ever call on you when you were unprepared - did you feel your stomach turn over or your heart beat faster? Were you open to learning then or did your mind "close down?"

People experiencing negative feelings find it almost impossible to assimilate new ideas, to solve problems, or to generate positive ideas. Their thoughts are on their problems. Sam is angry because he has had a confrontation with a classmate. Mr. Jones is worried because his son is in trouble with the police. Karen is afraid that she will make a "C" on a test. Dan is frustrated because he needs more time to complete an assignment. Sandy is disappointed because she did not make the track team.

Teachers try to help students deal with negative feelings. But if the teacher's responses are not carefully chosen, then little help actually occurs. For example, if Mr Jones is <u>told</u> not to worry about his son, will he stop worrying? If Sandy is <u>told</u> that she will make the team next year, will that lesson her disappointment? If Dan is <u>reminded</u> that he has already had two days to work on his assignment, will he be less worried? If Sam is <u>told</u> to settle down or he will be sent to the office, will he be less angry? Probably not.

Some responses teachers make are not very useful, and if teachers become aware of them, they can be more helpful to students. So there will be an examination of these not-so-useful responses and of the effect that these kinds of responses may have on someone.

SKILL #1. RECOGNIZING AND AVOIDING ROADBLOCKS

One useful way to begin developing effective communication skills is to learn to recognize nonfacilitative responses and to avoid them. Thomas Gordon, in his book Teacher Effectiveness Training, identified 12 categories of typical nonfacilitative responses, which he called "roadblocks." We have added two other categories. When a person is upset or angry, roadblocks are generally not helpful. They can convey to that person that you are not interested, you do not want to listen, you do not care about the person, or that you do not understand what the person is saying and feeling. Roadblocks can convey many negative messages: the person is not a competent problem-solver, the person needs to be led, or the person just is not very bright. These messages can be damaging to a person's self-esteem and to the student-teacher relationship.

As you read and think about the following roadblocking statements, please keep in mind that some of these statements might be OK when no one is upset by a problem. Roadblocks are statements which interfere with communication when someone is upset or angry. They are not helpful at such times, and they ususally make matters worse by damaging self-esteem and endangering positive relationships.

Roadblocks to Communication

Directive Responses. Directive responses carry a hidden message that the students' feelings or points of view are not being considered. The teacher is not interested in listening and wishes to dispose of the situation in the quickest and easiest way--and the way is to tell the student what to do.

1. Ordering, commanding, directing

"Stop complaining about the grading system and concentrate on doing the best job you can."

"Sit down and be quiet."

"Don't keep making excuses for late work, just get it in on time."

"Since you don't seem to understand the man's work, I want you to synopsize three of his articles for next time."

"Go right back out there and tell Martha you're sorry."

2. Warning, threatening

"If you don't start reading the assignments, I'll give a quiz at the beginning of every class."

"If you can't handle the work, you'll just have to take a "D" or withdraw from the class."

"If this chatter keeps up, I'm going to make a no-talking rule."

"If you don't pull yourself together, I'm not going to talk to you."

With directive responses, there are hidden messages that the student's behaviors, thoughts, or feelings are "wrong" or unacceptable. You might be able to recall times in elementary or secondary school classes when you were directed to "stop talking," or "sit down," or "turn in your paper," or "stop crying." Your reaction might have been, "But I didn't do anything wrong," and your feelings toward the teacher probably were not positive.

Even when a directive is meant to be helpful, it can still convey a lack of understanding. For example, suppose John has been up most of the night with an upset stomach, he is not feeling well, and he has no idea of how to do the assignment. The teacher, noticing that he is staring out the window, says,

"Get back to work, John." In this case, the teacher made an assumption about John: that he was just daydreaming, or being remiss, or perhaps being lazy. But the teacher guessed wrong, and her directive response conveyed that she did not understand that John was not feeling well.

Directive responses can produce hostility and resistance: "I don't have to," or "Who does he think he is," or " I won't." When a directive is accompanied by a warning or a threat, it becomes an even more blatant "power message." The student is wrong and there will be dire consequences if the student does not shape up! There is no attempt to understand or listen--the attempt is to stop the student, or else. Warnings and threats evoke hostility and resistance, and they also invite "testing:" "He won't get away with that," "The S.O.B. has gone too far this time," "Let's try it and see what he does," or " I wonder how far I can push her." Directive roadblocks can produce a wide range of reactions from resentful compliance to outright rebellion. In any case, directive roadblocks are not facilitative for the student and they can destroy any positive feelings the student may have for the teacher.

Solution responses. Solution responses are attempts to solve other people's problems for them.

3. Advising, offering solutions or suggestions

"Why don't you give up the weekend job and spend some more time with your family?"

"I suggest you start taking notes in class and go over them before the test."

"All you need is more confidence in yourself. Tell yourself you can really do it."

"Try making a list each day of all the things you have to do. Then check the most urgent ones and do them first."

"Get out and meet people. Start thinking about yourself for a change."

"Just tell him you won't do it any more."

Probably the most common response to a person who is involved in a problem is giving advice. And what's wrong with that? After all, the other person seems to need help--so why not give it? The main reason not to give advice is that a person who is upset most likely will not even hear the advice. Also, unsolicited advice right then could carry the message that the person is not even smart enough to solve his own problems. Such hidden messages can be devastating.

Another major problem with offering advice is that it is generally given from the teacher's perception of the student's needs, and not from the point of view of how the student perceives his needs. People often give suggestions and advice which would be comfortable for <u>them</u> if they were in the other person's situation. Think about how often you have heard, "If I were in your place, I'd..." Perhaps you can recall times when you were upset, confused, or discouraged, and you just wanted to "talk about it" with someone--and all you got was advice. Very likely, you responded with something like, "Yes, <u>but</u>..." or "I've tried that and..." or "Oh, I don't know..." or "Well, maybe that would work, <u>but</u>...." Maybe the advice did not "fit" or maybe you just were not ready to think about solutions--you just needed to be listened to and understood.

Roadblocks usually address other people's <u>apparent</u> problems rather than their real problems. By jumping in with one roadblock or the other, the focus of the conversation is taken away from the person with the problem. For

example, see what happens when Sam, who is seriously considering leaving his wife and is greatly troubled by the decision, opens up a conversation with a friend who is not aware of the home situation and jumps in with advice.

Sam: Another rotten evening.

Friend: What's the problem?

Sam: Oh, nothing much. Marian just keeps picking on little things like being late for dinner.

Friend: That's too bad. Why don't you talk to her about having dinner later, or maybe you could just start getting home earlier.

Sam: No...we can't talk very well any more. We get started and someone blows up.

Friend: Well, how about giving her a call before you start home? Maybe she wouldn't mind so much if she knew in advance.

Sam: Yeah. (pause) Well, it's not really that big a deal. (changing subject) Hey, what's up for the meeting with the boss this morning?

Sam's friend assumed that Sam's main concern was being on time for dinner (not true). He also assumed that Sam wanted him to solve his problem for him (not true). Sam just wanted someone to listen. His friend blocked communication because he jumped in with a very common roadblock--giving advice. When people give advice, they are not listening, they are into their own agendas.

Offering solutions can make a student feel put down and it can also convey a lack of confidence in the student's judgement. The student's reaction might be defensiveness or resentment if the proposed solution is

perceived as criticism or as a directive. For example, "Why don't you just be nicer to Nancy?" could be received as "You aren't nice to Nancy" or "Be nice to Nancy!" Another disadvantage of offering solutions is that students come to rely on an "outside authority" and fail to develop their own problem-solving capabilities. They expect the teacher to solve things for them and they become dependent on the teacher. They take no responsibility for solving their own problems.

There are many times in teaching situations when giving advice or suggestions is helpful, but when the other person is upset, there is a great risk that this kind of response will block, rather than facilitate communication.

Persuasive responses. Persuasive responses are attempts to persuade other people to change their feelings, thoughts, or behaviors. Guilt, shame, and intimidation are sometimes the hidden persuaders.

4. Moralizing, preaching, giving "shoulds and oughts"

   "When you cheat on a test, you're only hurting yourself."

   "You shouldn't feel guilty about turning someone in; you have a responsibility to the whole group."

   "Sure, it's a lot of hard work. Students today don't know what it means to earn a grade."

   "You shouldn't be doing this just for a grade. You should be doing it for yourself."

   "If you didn't vote, you shouldn't complain about the outcome."

   "You shouldn't feel that way about your parents."

5. Teaching, lecturing, giving logical arguments

   "It's very unlikely that your son is in trouble. Most runaways don't go very far, and they usually come home when their money runs out."

"If I gave you permission to turn in your paper late, then I'd have to let others be late too."

"When I was your age, I held down a job and went to school. And I didn't have a car either."

"If you drop this class, you'll have wasted a lot of time and money, and besides, you need the credit hours to get your raise."

"Believe me, the way you feel is really to be expected. Everyone who gets up in front of a class for the first time feels nervous and awkward. After a few days, you'll really begin to enjoy yourself."

6. Reassuring, sympathizing, consoling, supporting

"Oh, it's not all that bad. Everything will look better in the morning."

"Everything's going to turn out just fine. Just you wait and see."

"Sure, you can do it! You always come through in a crunch."

"There's nothing to be afraid of."

"You shouldn't feel guilty. You didn't mean to do anything wrong."

"I know you're going to get an "A" on the next test."

"You're not inconsiderate. You've just had a lot of things on your mind lately."

Persuasive responses carry the hidden message that other people should not feel the way they do. These kinds of responses do not convey an understanding of the other person's feelings or point of view. A common reaction is for the other person to just quit talking.

When a teacher is moralizing, preaching, or giving "shoulds and oughts," there usually is an implicit appeal to some god-like standard or authority. Students' reactions are guilt, shame, or anger. They are being told to conform to some vague set of expectations, or else. Resistance is common. As an example, imagine you are really irritated at an instructor because you got a "B" in a course and you find out that another student got an "A" who made the same grades on all the tests. You confront the instructor about this and the instructor says, "You really shouldn't get so upset about a grade. It's what you have learned that is important. Besides, it never helps to get angry about things like this." What is your reaction? Probably not positive. Moralistic messages are overused so often that chances are high that students will "tune them out." The tenth time a youngster hears, "You're supposed to show respect to adults," the message goes in one ear and out the other.

Teaching, lecturing, and giving logical arguments yield teachers' opinions, "irrefutable facts," or undeniable logical arguments. Imparting information is a legitimate function of a teacher in a problem-free situation. But when students are upset, it is very unlikely that facts and logic will pursuade them to change their feelings or their points of view. Too often, students perceive these as messages of being wrong or stupid, and this can lead to strong defensive positions.

Reassuring, sympathizing, consoling, and supporting are suggestive responses to students that their problems are not as bad as they seem and that they are capable of handling them. Unfortunately, the effect is very seldom facilitative for a person who is angry or depressed. The hidden message is, "No, you don't feel the way you do," or "You are silly to be so concerned about this," or "Why don't you just forget about it." A facilitative teacher is aware that it is OK for students to feel nervous, anxious,

frightened, or angry about things. To send a message that the other person should not have these feelings is a roadblock to students. Perhaps you can remember times when you tried to share fears, anxieties, or frustrations with another person, only to be reassured that "It's not as bad as it seems" or "It's going to be all right." Very likely you thought "She just doesn't understand" or "Damnit, it isn't going to be all right." On the other hand, you might be able to remember how close you felt to a person who somehow conveyed understanding of your fear or your anger or your disappointment instead of trying to "talk you out of it." Teachers often have good intentions when they reassure, sympathize or console, but when a student is upset they are ineffective.

Sometimes people reassure or support because they really do not want to facilitate communication. Perhaps they are uncomfortable with hearing the other person's thoughts and feelings. And, indeed, their reassuring or sympathetic statements are very effective in blocking further communication. A student says, "I just know I'm going to fail this test," and a teacher responds, "Oh, no, you're going to do just fine." End of conversation!

Facilitative responses convey acceptance of, respect for, and understanding of the other person's feelings. Any response to persuade him or her to deny those feelings is generally a roadblock to communication.

Evaluative responses. These responses involve a negative or positive judgment on the part of the teacher. The student's actions or feelings are evaluated rather than objectively observed.

7. Judging, criticizing, disagreeing, blaming

"You just aren't putting any effort into your work."

"You'll have to stop feeling sorry for yourself and realize that other people have problems too."

"Sure, you can do the work. You are just lazy."

"If you'd plan ahead, you wouldn't have all this to do at the last minute."

"No, the others aren't making fun of you. It's all in your mind."

"Did you ever stop to think that there are two sides to every story?"

"That's a ridiculous thing to say."

"That last paper was really bad."

"You're not yourself today."

8. Name-calling, stereotyping, labeling, ridiculing

"You're acting like a spoiled brat."

"All right, Mr. Know-It-All."

"You're a bunch of little babies. You want everything handed to you on a silver platter."

"I've had students before with your attitude. None of them went very far."

"That's the way losers talk."

"You're insane."

9. Praising, agreeing, giving positive evaluations

"You wouldn't intentionally do anything to hurt anyone's feelings. You're the kindest person I know."

"With as much common sense as you have, I'm sure you're going to handle this perfectly."

"You're right. What you did was justified."

"You're the most popular person in this class."

"Well, I think your clothes are lovely."

"You're bright and talented and you can do this with one hand tied behind your back."

10. Interpreting, analyzing, diagnosing

"You may think you don't want that job, but I think you really do. You're just afraid that you'll be turned down and you don't want to risk it."

"Your whole problem is your study habits. You put everything off until the last minute and then you panic."

"You just feel that way because your pride has been hurt. Six months from now you will have forgotten all about it."

"You're just acting that way to get attention."

Evaluation can be a legitimate function of a teacher in a problem-free learning situation, but when the other person is involved in a problem, it is not facilitative to evaluate or judge. Evaluative and judgmental responses come from the speaker's point of view--the speaker's value structure--while facilitative responses help others to recognize or explore feelings from their own point of view.

Roadblocks seven and eight, negative evaluations, are the most destructive kinds of evaluative responses because they can be damaging to the person's self-esteem. When negative evaluations are accepted as "true," more negative weight is added to an already negative self-image. When negative evaluations are rejected as false, the result can be resentment, anger, or hostility. Teachers' negative evaluations of students also affect teachers. Frequently they complain about the lack of respect they get from their students.

Most readers probably would agree that negative judgements or evaluations block communication, but what about positive evaluations

or praise? Praise is generally regarded as a very positive technique for classroom management. In problem-free situations where no one is upset, praise can indeed benefit learners. But when the student has a problem, praise can bring in outside judgements, evaluations, and contradictions.

Perhaps the most serious risk with praising a person who is upset is that the praise may be in direct contradiction with what the other person is feeling. Consider Sarah, who has just finished a painting that really disappoints her. It just did not turn out right for her and she is depressed about all the time she spent on it. Her teacher says, "Sarah, that's a really lovely painting. I like it better than anything else you've done." It is very unlikely that such a response would change Sarah's feelings. Instead Sarah might think that, "she just doesn't understand," or, "she's just trying to make me feel better," or, "She doesn't know what good art is." "I told her it was no good, and I'll be damned if she doesn't say it is good." That is a contradiction, and Sarah probably thinks the teacher must not care very much or she would listen better and try to understand what is being said.

Haim Ginott (Between Parent and Child, p. 37) illustrated the potential negative effects of praise with a story about a family on a car vacation. The mother and father sat in the front seat with the youngest brother between them. The older brother sat in the back, jealous and wishing all kinds of bad things for his brother. Near the end of the trip, mother turned around and praised older brother for being "such a good boy." Presently, the car went through a dark tunnel, and the back seat ashtray was dumped into the from seat. The older brother

knew he was not a good boy, and the guilt made him feel angry toward his mother. The dumping of the ashtray was how the anger came out.

It is legitimate for students to be upset sometimes. Facilitative teachers ackowledge these negative feelings. They do not praise or suggest that the feelings are "wrong." Facilitative teachers listen, and they focus their attention on the students, rather than on themselves.

Roadblock 10, interpreting, analyzing, diagnosing, is another evaluative response that is usually intended to be positive and helpful. But most people do not like being analyzed! People who are upset are generally not seeking rational explanations for their feelings or behaviors. Such explanations are not facilitative. If you have experienced someonetelling you why you felt the way you did, then you probably remember being "turned off." If the analysis was "right on" you might have felt threatened, like the person was able to see right through you. If the analysis was off, you might have felt resentful about being told what your thoughts were or of being accused of some ulterior motives. Or perhaps you felt angry because you just did not want to think about the causes of your feelings right then. Conversations usually end quickly when someone is analyzing, interpreting, or diagnosing.

In general, it is far more facilitative to "leave the ball" with the other person than to set yourself up as an "authority" who knows more than the other person does about his or her problems. Both negative and positive evaluations can convey that you are judging the other person and that you "know best."

Avoidance Responses. These responses are designed to avoid communication about the other person's problems. They convey disinterest or unwillingness to carefully listen.

11. Withdrawing, distracting, being sarcastic, humoring, diverting

"I don't want to talk about it."

"That's your problem, not mine."

"Let's talk about something more pleasant."

"Don't you have anything more important to worry about?"

"Oh, poor baby. Did the big bad teacher hurt the poor little baby's feelings?"

"You're making a mountain out of a molehill."

"Hey, you don't really want to spend all day feeling sad, do you?"

"Come on, let's see a smile."

"Hey, you look like a monkey with your face all screwed up like that."

"I used to feel that way myself. Once, when I was in your situation, I..."

"You think you've got problems? Let me tell you about what happened to me today."

12. Emphasizing your own needs

"No, I can't give a make-up test. Grades have to be in on Monday."

"Just think about the position that puts me in."

"I can't do anything about that. I set that deadline three weeks ago so this wouldn't happen."

"It would be great to talk about these concerns some more, but we have to move on or I won't get through Chapter 3 by tomorrow."

"Well, how do you think that makes me feel?"

"I will not tolerate anyone speaking to me like that!"

"It isn't my fault!"

"That's all I need right now, is to start getting a lot of flack from you."

"OK, so it isn't fair, but my job is pretty tough, too."

"I have 58 students and I just can't start explaining every little detail of how I grade."

"Well, I don't think it's fair to accuse me."

When a teacher does not want to listen to a student's problems, Roadblock eleven is very effective. Avoidance responses can range form clearly negative comments, such as sarcasm, to well-intentioned attempts to distract or divert the student from the problem.

Many people feel that they can "successfully" tease, humor, or kid other people out of sad or angry states. There are times when diversions may be helpful. Getting out of the house and going bowling might be therapeutic for a person who is depressed. In most cases, however, when a student is upset by a problem, there is a good chance that attempts to divert the student or to minimize the problem are not helpful. It becomes very clear to the student that, for whatever reason, the teacher does not want to listen or to talk about the problem. There is no way for an avoidance message to convey acceptance or understanding of the other person's feelings. Even though the student might appear to "cheer up," or to not

think about it, the problem is still there, and the Roadblock was very successful--it did block further communciation.

When a student is upset, teachers can roadblock communication by emphasizing their own needs. The roadblock is that "your problem isn't as important as the problem you are causing me," or "I don't want to listen to you; I want you to listen to a similar problem I had once." Teachers sometimes interrupt students to speak their own piece, and this in itself is a roadblock. When a student is upset by a problem, he or she cannot be helped when the topic of the conversation is shifted to the teacher's problems or needs! Facilitative teachers keep their attention focused on the student and try to understand what the feelings are behind what the student is saying. The teacher's needs are also important, but a better time to make those needs clear is after the student has had a chance to be "heard."

Any attempt to avoid communication can convey to the student that the teacher does not understand or does not care. The result can be anger, resentment, or hurt feelings at not being understood. These feelings may eventually surface and they can affect the student's learning.

Questioning responses. Questioning is a very common response. The impulse to ask questions is so ingrained in adults that they are seldom even consciously aware of the purposes of their questions. It is important to be aware of the negative effects questions can have on someone who is experiencing a problem.

13. Questioning, probing, interrogating, cross-examining

"What made you think you could get away with it?"

"Why didn't you just walk away from him?"

"Why are you getting upset?"

"Why are you making such a big thing out of this?"

"You're not going to quit school, are you?"

"You didn't really mean that, did you?"

"Do you still put everything off until the last minute?"

"Why are you late for every class?"

"Why didn't you think of that before you did it?"

Good questioning techniques are important skills for teachers in problem-free, learning situations. But if the teacher wants to be facilitative with a student who is upset, questioning and probing should not be used. Most people feel obligated to answer questions, so the control of the conversation shifts to the questioner since the questions are his--he is the one interested in the answers. The irony is that people who question often generally intend to be helpful, but they are seeking information to use to solve the other person's problem, and most people do not like other people trying to solve their problems when they are upset.

One of the authors often uses a "listening for feelings" activity at seminars for student teachers. Each person, in turn, describes to the person on their right a situation which was upsetting during the last week. That person tries to reflect back the feelings of the person with the problem. "You felt frustrated" or "you resented that" or "you were afraid of what would happen next." Other group members are invited to add their conjectures about the feelings and, invariably, forgetting the exercise, they want to help solve the problem, and then the questions begin! "Did you try asking the students to leave the room?" "Do you

think the student was trying to get your attention?" "How did you feel when the rest of the class got noisy?" "Why don't you try writing a contract with the student?" "Had you been reinforcing the student's positive behaviors before this happened?" The student teacher with the problem almost always states that it really "felt good" to talk about the problem, and when the others reflected feelings, it really "felt good" to be understood. But when there was questioning some student teachers felt defensive because they were forced to listen and to respond to someone else's ideas. Others felt resentment because it began to sound like they were the only ones who handled problems poorly, and everyone else seemed to know better ways to have handled them!

Very often, questions are just other kinds of Roadblocks in disguise. Many of the questions asked in the expample of the student teachers are thinly-disguised advice: "Have you thought about trying...?" or "Why don't you try...?" Threats are often disguised as questions: "Do you want to go to your room?" Other questions are really interpreting and analyzing: "Don't you think you might have done that because...?" Commands can also be disguised as questions. "How many times have I told you not to slam the door?" is a command: "Don't slam that door again!"

Wittmer and Myrick[1] have categorized some kinds of questions which have a low probability of facilitating personal growth.

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[1]Wittmer, J. and Myrick, R.D. Facilitative Teaching: Theory and Practice. Pacific Palisades, Calif.: Goodyear Publishing Company, 1974, pp. 62-68.

The "why" question. "Why" questions are usually threatening and they tend to put other people on the defensive when they feel that they need to justify or explain their behavior. This reaction probably comes from all the "why" questions that people have been asked as they were growing up. "Why didn't you hang up your clothes?" "Why do you talk to me like that?" "Why didn't you say, 'thank you'?" Youngsters quickly learn that these are "disapproval" messages and that the adult means "don't do it again," instead of"why did you do it?"

In some situations, it is useful to be aware of the purposes of someone's behavior, but purposes of behavior are seldom discovered by asking the person. More often that not, people do not know why they did something when they are first asked. A facilitative teacher knows how to encourage students to talk, and sometimes reasons for behaviors do become clear. But it is very unlikely that a student will be able to respond to a "why" questions with very much useful information.

The binding question. A person who asks a binding question is really making a statement and does not even want to hear an answer. "Would you quit carring on and get back to work?" "Don't you think before you blurt out something like that?" "Don't you know you could put someone's eye out when you throw your pencil?"

The soliciting agreement question. Here, the questioner does want to hear an answer, but the questions are stated such that only agreement is acceptable. "You know I have no choice, don't you?" (yes) "You didn't really mean that did you?" (no) "You don't really think this is your best work, do you?" (no) People usually resentfully agree to such questions.

They are not facilitative.

The forced choice question. Here, the other person has a limited choice. Two alternatives are presented by the questioner, and often the questioner's preference is clear. "Do you want to straighten up or do you want to go to the office?" "Are you going to waste your time or are you going to get to work?" "Do you want to write this paper or do you want a test?" There are times when choices are a good idea, particularly when limits need to be set. For example, a child might be given a genuine choice, (and time to think about it) between eating dinner with the family and not fighting with little brother, or eating dinner in his room by himself. However, such choices are generally not useful when a person is upset by a problem. The rational part of their thinking is not operating well.

The double bind question. The classic example is, "Have you stopped beating your wife?" No matter which way the question is answered, a negative judgement can be made be the questioner. Other examples are, "Are you still on drugs?" "Have you cleaned up your language?" Not facilitative.

There are some kinds of clarifying questions which may be facilitative, and these will be mentioned later in the chapter. They are genuine requests for clarification of the problem. For example, "Did that effect your grade?" Generally, however, try to avoid questions when another person is upset.

Interrupting. Interrupting is a very common non-listening response.

14. Interrupting, interjecting, rushing

"But, don't you see..."

"Yes, but..."

"Let me tell you..."

"No,no,no..."

(nonverbally shaking head "no" while other person is talking)

It is probably pretty clear why interruping is a communication roadblock. Interrupting imposes tension on a conversation, and neither person ends up listening very well. The person being interrupted feels that his thoughts are not respected.

As you were reading through the Roadblocks, some of the responses probably sounded very familiar. Many people react by saying, "That's me!" or "Wow! I say that all the time," or " I really hate it when someone says that to me." Another common reaction to the Roadblocks is, "What's so wrong about saying that?" It is really important to keep in mind that these kinds of responses tend to block communication when someone has a problem or is upset. Some of them can be OK when everything is "smooth" between the teacher and student.

We encourage you to examine the Roadblocks in the context of your personal experiences. Try to remember how you felt when someone sent you a Roadblock. In the next few days, listen for Roadblocks people deliver to you and be aware of how you feel toward those people right then. Begin to be aware of the Roadblocks you send to other people. Just to recognize Roadblocks and to avoid sending these nonfacilitative responses is a skill and a big first step toward becoming a facilitative person.

Exercise Set 1

1. For each statement below, tell what kind of Roadblock it is.

   Example. You haven't done anything but waste time since you came in here.

   Evaluative Response: criticizing

   a. Don't worry, You'll do just fine.

   b. If I hear one more word out of you, you're going to the office.

   c. You shouldn't blame other people for your own mistakes.

   d. You lose your temper because you don't realize that the others are just kidding.

   e. But you write very well--better than most students I've had.

   f. Now that's it! If you're going to act like a baby, I'll treat you like a baby!

   g. Why do you always quit when the going gets a little rough?

   h. Well,did you do something to lead him to believe you were thinking about sex?

   i. Put that magazine away and don't let me see it again.

   j. The next time someone calls you a name, just ignore it.

   k. Sure, you heard what I said, just like my name is Muhammed Ali!

   l. Yes, you will write that report--and your mother will hear about this too!

   m. How would you like it if the person who used the equipment before you decided not to clean it up?

   n. People who only think about themselves end up without any friends.

   o. You're not cooperating. I want to help, but you won't let me.

p. I don't want to hear any more complaints.

q. Oh, it's too nice a day to feel sad!

2. For each situation, write several Roadblocks of the kind you have heard from other people or have delivered yourself. The types of Roadblocks are specified for each situation.

a. Al is afraid to give his oral report in front of the class and he says, "My dad says you can't make me read it. He says you should just grade me on the written report."

Avoidance Response: sarcasm _____

Directive Response: warning, threatening _____

Persuasive Response: reassuring _____

Persuasive Response: logical argument _____

Evaluative Response: judging, criticizing _____

b. Mr. Sims is not confident about enrolling in a TV repair course. He says, "I don't think I'd do so well. I'm pretty good with my hands, but I probably couldn't pass the written work."

Persuasive Response: reassuring _____

Persuasive Response: logical argument _____

Solution Response: offering suggestions _____

Persuasive Response: giving "shoulds and oughts," preaching _____

Evaluative Response: criticizing _____

Evaluative Response: praising _____

Avoidance Response: distracting _____

Questioning Response: forced choice question _____

3. Without looking back in the text, express in your own words why <u>each</u> of the following types of questions is not facilitative when a person is upset.

    a. The Binding Question

    b. The Soliciting Agreement Question

    c. The Forced Choice Question

    d. The Double Bind Question

4. What could you do or think about to remain <u>aware</u> of not interrupting someone during conversation?

SKILL #2. ATTENDING TO WHAT IS SAID

One of the first steps toward becoming a facilitative teacher is to learn to listen fully to what students say. Most people think they are pretty good listeners, and most people do hear other people's words to the extent that their responses are on the same topic. However, effective listeners have learned to focus on the personal meaning of what is said, not just on the literal meaning. The question is, "What feelings are being communicated and what meaning does this topic have to that other person?"

Listen in on a conversation among Martha, Pete, and Greta. Does it sound familiar? How does Martha probably feel when Pete and Greta are responding to her?

Martha: The thing is, I just can't get much teaching done with all the special periods, the testing, the interruptions, the pressure to get the students to "grade level," and so on. I don't even like teaching anymore.

Pete: Me neither. Today I had three interruptions. Around 10:00, Mr. Johnson came in and told me that...[a story about Pete's experience with Mr. Johnson] . . .

Martha: I don't see how I'm going to last until the end of the year.

Greta: You'll make it. I used to feel like you do, but it gets easier every year.

Martha: Maybe so, but I don't think I care to fight every minute just to do my job.

Pete: I know what you mean. I went to the superintendent last year to complain about this new schedule and I told him... [a story about Pete's experience with the superintendent]...

Martha: Why do we have to fight battles all the time? I just want to teach kids!

Greta: You think you have a problem! Let me tell you about what happened to me last year when I tried to...

Martha was really "down," discouraged, and feeling miserable. She needed to talk and to have someone understand and to listen. The conversation was typical of ones that occur in teacher's lounges, at parties, in carpools, over lunch, etc. Martha repeatedly sent very strong messages that she had problems she had not been able to solve. Greta and Pete heard what she said, but their responses have no indication that they were really listening. When it was their turn to speak, what did they do? They shifted the focus to themselves and away from Martha's problems. They stayed on the "subject," but their responses were not facilitative for Martha.

Facilitative listeners make a decision that, for a while, their attention will be focused on the other person. They do not think about themselves and they concentrate fully on the words and feelings of the other person. They try to imagine how the world looks through the other person's eyes. Examine your own thoughts the next time you are in a conversation. Very likely your mind will wander from what is being said and you will begin to think about what you will say next. In such cases your responses will communicate to the other person that your agenda is more important than theirs.

The following exercise is a good beginning for attentive listening.

SKILL BUILDING EXERCISE

Have two to five people choose a topic for discussion, preferably a topic which may reflect differing values for the participants; for example; corporal punishment, abortion, pre-marital sex, politics, etc. (Youngsters might discuss playground rules, homework, use of free time, etc.)

The only rule is that a person who wishes to speak must first briefly and accurately summarize what was said by the previous speaker, and the previous speaker must agree that the summary is accurate before the next person may go on.

After 10 or 15 minutes, stop the discussion and process awarenesses and feelings of individuals. How difficult was it to accurately reflect what was said? How did it feel to have your own ideas restated? How often was it necessary for a speaker to clarify a person's summary? Judge the quality of the communication.

SKILL #3. ENCOURAGING THE OTHER PERSON TO TALK

Sometimes students will need your encouragement to begin talking or to continue talking. How do you convey a genuine interest in hearing what the student has to say? There are several suggestions.

Silence

Silence is a skill that many of us need to learn and to practice. In our society, people are often embarrassed by long periods of silence. Meaningless things are said just to "fill in the gap." However, it can be very helpful at times to allow people time to collect their thoughts or perhaps to gather courage to express their thoughts and feelings.

Nonverbal Encouragement

Your body can convey that you are interested in listening. Eye contact conveys that you are being attentive. Turning to fully face the other person is a message that you are giving your full attention. Even leaning forward slightly can convey interest. If you were reading or writing, you can close your book or put your pencil down. You can be aware of the physical environment by moving out from behind your desk, a natural physical barrier between teachers and students. Nodding your head at times can say, "Yes, go on, I'm listening," "I'm sure sorry to hear that."

Verbal Encouragement

Very simple statements can be encouraging. "I see," "uh-huh," "oh, no!" "wow!" Sometines more direct encouragement is called for, particularly if the other person is silent for a long time. "Would you like to talk about it?" "Go on," "I have some time right now if you'd like to

talk some more," "Do you have time to talk about it now?"

Verbal and nonverbal encouragement to go on make the other person feel comfortable about talking and convey your interest in what they have to say. In many cases, this is sufficiently facilitative for the other person to "talk it out." You may be thanked for being so helpful and you may find yourself saying to yourself, "But I didn't do anything!" Just as a young child sometimes needs to "cry it out" and just be held, a youngster or an adult usually feels better after someone conveys enough caring to really listen.

Suppose you are a listener, and you find that you want to respond with something useful or helpful. At this point, watch out; many "listeners" toss in Roadblocks. Remember to be aware of when you use Roadblocks and what Roadblocks you use, and try to avoid using them.

But what can you say that <u>will</u> be useful? What kinds of responses <u>are</u> facilitative?

SKILL #4. RESPONDING TO WHAT WAS SAID - REFLECTING MEANING

Paraphrasing

One very effective listening response is simply to reflect back what was said. This leaves the ball with the speaker and gives evidence that listening occurred. It also may help the speaker "hear" what the speaker was saying. Of course, it would sound awkward to simply repeat or parrot the other person's words exactly, so try to paraphrase so that it sounds natural. Here are some examples.

- Other person: I can't stand the way Jones keeps pacing up and down!

  Parroting: You can't stand the way Jones keeps pacing up and down!

  Paraphrasing: Jones pacing really bothers you!

- Other person: I just don't know how to keep those two people from monopolizing the meeting.

  Parroting: You don't know how to keep those two from monopolizing the meeting.

  Paraphrasing: Getting everyone involved is tough when those two talk all the time.

Exercise Set 2

For each statement, write a response which paraphrases what was said. The starred examples (*) are from previous exercise sets. It is important to do these.

1. I don't see why I should knock myself out on this paper. You never give useful comments, just checkmarks!

   Paraphrase_____

   _____

2. This course is for the birds! I can't use any of this stuff in my job!

   Paraphrase_____

   _____

3. No one cares about what I have to say! They always treat me like I'm some kind of dummy.

   Paraphrase_____

   _____

4. I don't want to go out to recess! I hate it!

   Paraphrase_____

   _____

5. My mom doesn't care if I stay in school. She doesn't even ask me about my grades. Dad doesn't care either. He's never home, anyway.

   Paraphrase_____

   _____

6. I don't want another dog! It would just die like Muffin did!

   Paraphrase_____

   _____

*7. Al is afraid to give his oral report in front of the class and he says, "My dad says you can't make me read it. He says you should just grade me on the written report."

Paraphrase_____

_____

*8. Mr. Sims is not confident about enrolling in a TV repair course. He says, "I don't think I'd do so well. I'm pretty good with my hands, but I probably couldn't pass the written work."

Paraphrase_____

_____

Clarifying, Confirming, Summarizing

Sometimes it is difficult to understand what a person is saying because some crucial information is missing. It can be helpful to ask for more information to try to clarify what has been said.

"If I understand you correctly, you tried to explain your actions, but she wouldn't let you. Then it was after that, that you wrote the letter."

"So you went along with the group up until Friday and that's when you decided that it was all wrong."

"When did all this take place?"

A word of caution about clarifying statements which are questions: try to avoid questions that probe, like "Why did you think you had to go along with the group?" or "What made you think he was angry at you?" If you must ask a question, avoid "why" questions. Ask factual questions only for purposes of clarification, otherwise they may be roadblocking.

Exercise Set 3

Directions: A conversation between a student and a teacher is given in the box. Below the box are six possibilities for what the teacher could say next. Use (a), (b), (c) to analyze each of the six possibilities for how facilitative it is for the student.

(a) Is it a Roadblock, a clarifying statement, a confirming statement, or a summarizing statement?

(b) What do you think the real purpose of the question or statement was? Any "hidden meanings?"

(c) What was the student's probable reaction or probable feelings toward the teacher? (Think about how you would have reacted!)

Student: Don't try to talk me into staying in the program! I've had it with night classes and reports and all the rest. I don't care about the money I've spent either!

Teacher: You've really had it and that's it! (Paraphrasing)

Student: Yes. And I don't even care about moving up in the pay scale. (pause) Darn! I was so close to finishing! It's not really the work. Everything being equal, I could handle that. But that thing with the registrar really did it. John isn't helping either, so it's all just a big mess. Well, when it rains it pours!

1. Why don't you sleep on it and think about it again tomorrow?
2. What problems are you having at home?
3. John is your husband?
4. Do you really want to quit or are you just making a mountain out of a molehill?

5. I understand what you're saying except the part about the registrar.
6. So you would be in pretty good shape if it weren't for a complication with the registrar. And all this aggravation is affecting your home life.

Listening for Feelings

Paraphrasing, clarifying, and summarizing are responses to what was said. They can be facilitative because the other person knows you are listening attentively and you are interested. Also, when you give these responses, you are not responding with Roadblocks. However, these responses do not necessarily communicate that you understand what the other person is feeling. When you understand feelings, you are being empathic.

Everything that you say to other people is preceded by and is the result of some internal thought or feeling you have. Your thoughts and feelings are encoded into verbal messages. More often than not, what you say is not an exact translation of what you are thinking or feeling. Even a message that sounds very direct, like, "You're standing on my foot," really means, "Move! Get off my foot!"

If you are lucky, the person to whom you send a message is a good "decoder" and responds to your thoughts and feelings rather than taking your message literally. Most social beings have some skills at decoding the meaning of verbal messages. If is a rare person who would take you literally if you were to say, "How many times have I told you not to slam the door?" The other person knows your meaning and your feelings: "I'm irritated because you slammed the door!" People learn from the time they are very young to decode a lot of verbal messages for their meaning and to read nonverbal clues for the feelings behind them. A child soon learns that, "Come here," spoken with a smile and outstreched arms means "Let's have a big hug," and "Come here," spoken sternly and with an empathic finger pointing to the ground means, "I'm angry with you."

Poor communication skills are a major obstacle in human relations. Why is that? One reason is that people learn, as they grow up,to send messages that disguise their true feelings. Either by direct instruction or from the reactions of others, people are taught that it is unacceptable to reveal certain feelings, particularly negative ones: Do not cry, throw things, express dislike for things or people, display too much exhuberance, admit fear, touch other people, be quiet for too long, and so on.

Negative feelings are often expressed by sarcasm or humor. If these lead the recipient to become upset, the speaker can always respond that he was "just kidding." Another way of expressing "unacceptable" thoughts of feelings is nonverbally. Boredom is communicated by losing eye contact or looking at a watch. Students may cut classes or not participate when they feel fear or insecurity. Silence covers up a multitude of negative emotions. It can convey, "I'm angry with you and I've decided to punish you since I can't get my needs met." Silence can also indicate that a person is sad or lonely or afraid, but doesn't trust anyone enough to share those feelings.

The key skill for a facilitative teacher is to develop a sensitivity to the feelings and meanings which are often diquised by the literal meaning of another person's words. The following exercise is a good way to begin listening for feelings.

SKILL BUILDING EXERCISE

A good beginning exercise is for a group sitting in a circle. One person begins by describing to the person on his or her right a problem situation which recently occurred. That person then responds by saying, "You felt..." and listing feeling words. The group facilitator should help the responder to simply give feelings. Often, people will begin to analyze or reassure or give advice, but the idea is to describe feelings only.

We recently had a student-teacher who paraphrased and summarized very well when listening to students. But she was not "picking-up" on their feelings. When the students evaluated her at the end of the year, about 70% of the class said she understood them, but did not know how they felt.

Exercise Set 4

1. Most feeling words can be put into one of the categories Sad, Mad, Glad, and Afraid. Feeling words range from mild to very strong, Two examples are given below for each category. Add at least ten more feeling words to each category.

Sad	Mad	Glad	Afraid
depressed (strong)	enraged (strong)	ecstatic (strong)	terrified (strong)
melancholy (mild)	miffed (mild)	pleased (mild)	apprehensive (mild)

2. For each of the following, give one or more feelings which might be behind the verbal message. The starred examples are from previous sets. It is important to do these.

   a. I haven't taken a test in years and years.

   b. I never get picked to be a pitcher. This is a dumb game, anyway!

   c. I don't feel like giving my book report today. I just found out I flunked my math final.

   d. Guess what? I've already finished my project. I got carried away last night and worked on it until 3:00 this morning.

   e. If you think I'm going to stand up there in front of the class and make a fool of myself, you're crazy!

   f. You can go to hell! I'm not going to do what you or any other teacher tells me anymore!

   g. There she goes again, monopolizing the discussion. Does she know how stupid she sounds?

   *h. I don't see why I should knock myself out on this paper. You never give useful comments, just checkmarks.

*i. This course is for the birds! I can't use any of this stuff in my job!

*j. No one cares about what I have to say! They always treat me like I'm some kind of dummy.

*k. I don't want to go out to recess! I hate it!

*l. My mom doesn't care if I say in school. She doesn't even ask me about my grades. Dad doesn't care either. He's never home anyway.

*m. I don't want another dog! It would just die like Muffin did!

*n. It's Al's turn to give his oral report in front of the class and he says, "My Dad says you can't make me read it. He says you should just grade me on the written report."

*o. Mr. Sims has been considering enrolling in a TV repair course. He says, "I don't think I'd do so well. I'm pretty good with my hands, but I probably couldn't pass the written work."

Listening Beyond Angry Feelings

Anger is a very strong feeling, and it is usually easy to identify. However, anger is almost always a secondary feeling. A classic example is the anger of parents toward their children. A mother tells her child not to climb to the top of the jungle gym, but the child does anyway and falls to the ground. When the mother sees the child falling, her feeling is fear. But by the time she runs up to the child, who is OK, she is only aware of her anger. Instead of saying, "I was so afraid that you would be hurt," her fear has turned to anger and she says, "Didn't I tell you not to climb up there? You're getting a spanking for disobeying me!"

Anger can follow quickly on the heels of primary feelings such as frustration, rejection, insecurity, fear, or unfairness. Here are some examples.

*Robert is disappointed with the amount of his annual raise. He feels unappreciated by his boss. He is afraid that his boss sees him as incompetent. His secondary feeling is anger toward the boss.

*Theresa feels frustrated about completing a paper on time. She cannot get her thoughts together and she feels somewhat inadequate. Her secondary feeling is anger toward her instructor.

*Sandra is disappointed when her husband forgets her birthday. She feels rejected and unloved. Her secondary feeling is anger toward her husband.

*Art feels that the grade he received on a test is unfair. He also feels anxious about bringing his overall grade up to an A and fearful about getting a B or a C. His secondary feeling is anger toward his instructor.

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Take a moment right now to recall times when you have been angry, and try to identify the primary feeling which might have preceded the anger.

One of the most difficult times to listen effectively is when the other person is angry. At those times, it is very easy to respond to the anger, to become defensive and to forget to listen. But skillful listeners know that focusing on the other person's anger is of secondary importance, and they try to search for the primary feelings which preceded the anger and brought it on. Several examples in the next section illustrate how skillful listeners respond to angry people after sensing what their primary feelings are.

Responding to Meaning and Feelings--Active Listening

Paraphrasing and reflecting meaning have already been suggested as facilitative listening responses. Even more important is the skill of reflecting feelings. When meanings or feelings, or both, are reflected it is called "Active Listening." Notice how feelings, as well as meanings are reflected in the following example of good Active Listening skills by a teacher.

Student: (angrily) Well, here's my project. I hope you like it, because it took a lot of work, but I only did it because it was required!

Teacher: The project was a real waste of time for you. (REFLECTING MEANING)

Student: Real busy work! I have better things to do with my time!

Teacher: You really resent the time you spent on this. (REFLECTING FEELINGS - resentment)

Student: Yes! (pause) Well, it was interesting and I did learn some things. It's just that I can't do this kind of thing in my classroom. My kids would go wild at first, and the principal would have a fit.

Teacher: You wouldn't mind trying it, but you're a little afraid of what might happen. (REFLECTING FEELINGS-fear or apprehension)

Student: You bet! In my school, it's a real risk just to put the desks in a circle! Sometimes I wonder why I even bother to take classes and learn new ideas.

Teacher: I guess it can be really frustrating at times. (REFLECTING FEELINGS-frustration)

Student: Yeah.

In this example, the student was angry and the teacher could have "bought into" the student's problem and responded defensively with a Roadblock like, "Well, if you remember, I told the class to see me individually if any one had problems with the assignment. You should have done that." Then the conflict could have escalated. Or, the teacher could have dismissed the student's feelings with, "Well, I'm sure it's a very good project. Sooner or later, you'll appreciate having done this." That could have ended the conversation with the student "turned off" and thinking that the teacher didn't understand and didn't care.

Instead, the teacher was alert that the student had a problem. The teacher listened to the student's anger and reflected back meanings and feelings. Two things happened: (1) once the angry feelings were out, the

student calmed down, and (2) the real problem came out-- not anger at the teacher for requiring the project, but frustration with a restrictive school system.

When a student "blows up," it is particularly important for the teacher not to react to the precise meaning of what was said, because the angry words most often screen the real problem. If the teacher reacts defensively, the teacher is focused on self-protection and is not listening for the student's real problem.

It is more useful to encourage an angry student to keep talking than to give put-downs, to argue, or to give rebuttals. As the anger is vented through verbalizing, angry feelings subside and are diffused. If the student keeps talking, the real problem will often emerge and the screened feelings may become apparent: sadness, frustration, resentment, etc.

Teachers' messages for the student should be held until the student has cooled off so that the student will be in a frame of mind to actually listen and get the message the teacher sends. If a student outburst is extreme, and the teacher wants to tell the student, for example, that name calling and four-letter words are completely unacceptable, then it would be best to deliver this message after the student has cooled down. Otherwise, it is very unlikely the message will be heard and fully processed.

It is important not to expect that a few minutes of Active Listening will necessarily bring about a "solution" to the other person's problem. In the example of the student who was frustrated about trying new ideas in her classroom, the problem was not solved right then and there, and

maybe the problem would never be solved! But the feelings were shared and the student knew that the teacher understood. That probably "felt good." The teacher knew that it was the student's problem to solve, and it is likely that the student would feel comfortable about discussing the problem again with the teacher. And when the other person is no longer upset, it is a legitimate function of a teacher to offer suggestions. In this last example, the teacher might have started by saying, "If you ever feel like tackling that problem, I'd be glad to talk with you about it. I might have some suggestions." Or, "Say, I'm pretty sure that some other people in the class have the same problem; would you be comfortable bringing it up in our next group discussion " The primary purpose of Active Listening is not to offer suggestions; instead, it is to let the other person know that you understand, that you are accepting of them, and that you care.

Active Listening is not just for explosive situations, as when a student is angry or defiant. Active Listening is also useful for the usual kinds of problems students have in trying to cope with their daily lives. Teachers who are skilled Active Listeners develop positive interpersonal relationships with their students. In this next example, a skillful, sensitive instructor established the beginnings of a close relationship with a student.

> Kris, a high school teacher, is taking an adult education class on Thursday nights. For the last two meetings, he has been more quiet, more withdrawn, and less responsive. Having noticed the change, Mr. Barnes, the instructor, finds a chance to be alone with him during the break.

Mr. Barnes: How's it going, Kris?

Kris: (shrugs)

Mr. Barnes: Not a good week, huh? (REFLECTING MEANING)

Kris: No, not so good.

Mr. Barnes: It probably gets pretty hectic at school around exam time. (REFLECTING MEANING, BUT GUESSING)

Kris: Not really...not really. (silence) I've just been having some serious problems with my son lately.

Mr. Barnes: (nodding "yes") Oh...(INDICATES THAT HE IS LISTENING)

Kris: (silence)

Mr. Barnes: That can be pretty tough at times. (REFLECTING FEELINGS) Would you like to talk about it? (ENCOURAGEMENT TO GO ON)

Kris: I'm not sure.

Mr. Barnes: It's difficult to talk about. (REFLECTING MEANING)

Kris: Yes, very.

Mr. Barnes: (puts hand on Kris' shoulder--long silence)

Kris: I really think I might have to drop out of the class. I don't think I can keep up with the work.

Mr. Barnes: It's not easy to keep up the work when you're so worried. (REFLECTING MEANING AND FEELINGS)

Kris: Yes. I'm behind in the readings and I haven't even started the paper.

Mr. Barnes: You're afraid you won't complete the work by the end of the semester. (REFLECTING FEELINGS)

Kris: I don't see any way. I just hate to ruin my grade point average.

Mr. Barnes: How do you feel about coming to class? Could you come for the class discussions? (CLARIFYING QUESTION)

Kris: Oh, yes. In fact, I really like coming to class--it takes my mind off things for a while. But I don't know about the paper and I won't do well on the final.

Mr. Barnes: It's the outside work that concerns you. (REFLECTING MEANING)

Kris: Yes. But I'm getting a lot out of the class discussions.

Mr. Barnes: Well, I don't have any problem with your taking an Incomplete in the course. You would have a year to turn in the paper and you could take the final whenever you're ready. (GIVING INFORMATION)

Kris: Wouldn't that be extra work for you?

Mr. Barnes: It's no problem for me. And I'd really like to have you stay in the class.

Kris: Thank you. I'll think about it and let you know.

Mr. Barnes was alert to nonverbal clues from Kris. He was certain that something was bothering Kris and he wanted to listen if Kris wanted to talk about it. At first, Kris did not give much indication of what was bothering him, so Mr. Barnes reflected what he thought might be distracting him--a hectic period at work. Kris replied, "Not really...," and then the real problem started to come out. Sometimes a listener is reluctant to try to reflect meaning or feelings for fear of being "wrong." But it is very typical for the other person to react as Kris did--to say, "No, ...it's just that...," and to start talking about the real problem. It is often useful to try to reflect meaning or feelings even when the

reflection is not "on target." An inaccurate reflection is not a Roadblock, and it does not convey misunderstanding as much as it conveys a sincere interest and an attempt to understand.

At the beginning, Mr. Barnes did not intrude--he offered to listen, and he respected Kris' reluctance to talk about the problem. Nonverbally, with his silence and with a hand on Kris's shoulder, he communicated that he understood Kris's pain. So often, people are embarrassed by a show of emotion, so they quickly rush in to solve the problem. Unintentional Roadblocks are frequently given and attempts are made to talk the person out of the sad fellings. Instead of trying to short-circuit real emotions, good Active Listeners have found that it is a genuine relief for people to go ahead and talk freely and let out their emotions.

Once Mr. Barnes had shown empathy and concern, another of Kris's concerns came out. He was distressed about his prospects for completing the course. It is likely that he might have been reluctant to mention it had Mr. Barnes not cared. In this situation, Mr. Barnes was able to ease the pressure by offering an alternative to completing the work by the end of the semester. Kris still had the problem with his son and it was still his to solve. Mr. Barnes listened, tried to understand, and he offered information for a related problem without pressuring Kris with advise and solutions.

Not all interactions involving Active Listening have "happy endings." The following interchange occurred when a supervisor of student teachers was just beginning to develop Active Listening skills.

Kate was a student teacher with a double major in special education and elementary education. She had completed her student teaching

in a special education classroom and had done very well. However, her other assignment in a regular elementary classroom had not gone so well. It was fairly obvious that Kate preferred working with special education students. Very likely, she had pursued a dual certification in order to enhance her "marketability." Her cooperating teacher in the regular classroom was not skilled in interpersonal interactions, and for whatever reasons, it looked like Kate had tried to "slide through" with minimum effort. Kate's final evaluation was not good. The supervisor arranged a conference with her to talk about the evaluation.

Supervisor: You were so quiet when we talked with Mrs. Jacobs about your evaluation. I thought you might want to discuss it a little further. (INVITATION TO TALK)

Kate: (guardedly) No. It's all right. (long silence)

Supervisor: I don't think you're too happy with the final evaluation. (REFLECTING FEELINGS: ENCOURAGEMENT TO TALK)

Kate: No, it's OK. (silence) Well.... nobody likes to get a C.

Supervisor: You're really disappointed with your grade. (REFLECTING FEELINGS)

Kate: (eyes watering) Well, I thought I did better than a C. I really tried hard.

Supervisor: It doesn't seem like you got credit for the work you did.

Kate: (holding back tears) I did try! This makes it look like I didn't do anything!

Supervisor: (long pause--trying to realize actual feelings) It seems like no one appreciates the work you did.

Kate: (nods "yes"; tears start coming)

Supervisor: (again groping for real feelings) It just doesn't seem fair!

Kate: No! (outburst of tears)

Supervisor: (silence--lets Kate cry)

Kate: (blowing nose) I'm sorry... I didn't mean to cry.

Supervisor: It's OK. You're really disappointed.

Kate: (nervous laugh) I'm really a crybaby.

Supervisor: Well, there's a lot of tension involved in these final evaluations.

Kate: (relaxing a little) I know. I've been tied up in knots all week. Things haven't gone all that well, but I really tried hard--I really did.

Supervisor: In spite of your efforts, things just didn't come together for you. (REFLECTING MEANING)

Kate: Not in that class. But I can be a good teacher. My evaluation from Mrs. Johnson was really good.

Supervisor: You know you can be a good teacher because of your experience in the special ed class. (REFLECTING MEANING)

Kate: Yes. The time went so fast there. But it was so different in the regular class. I didn't feel like those kids really needed me.

Supervisor: The motivation just wasn't there for you. (REFLECTING MEANING)

Kate: No, it really wasn't. I did try, but it wasn't the same. What a waste of everyone's time!

Supervisor: You're sorry you decided to also student teach in a regular class (REFLECTING FEELINGS)

Kate: Yes and no. At least I know what I really want to teach now.

Supervisor: Not a bad thing to learn--not bad at all.

Kate: True, but now I have a C on my record. And I'll need letters of reference to get a job.

Supervisor: Well, I can recommend you for teaching special education students. And I'm certain that Mrs. Johnson would write a positive letter. Like you said, you did a really fine job in her class. (GIVING INFORMATION IN A PROBLEM FREE AREA)

Kate: Would you? I mean, you would write a letter?

Supervisor: Kate, I'd really like to see you get a special education job and that's what my recommendation would say. (GIVING INFORMATION)

Kate: What about my goof-up in the regular class? Won't principals look at that?

Supervisor: Depends on the principal. But I think they'll be most interested in your special ed credentials if that's the postion you're applying for. (GIVING INFORMATION)

Kate: Oh, man. I really blew it, didn't I? But maybe there's hope.

Supervisor: You were really worried about what all this would do to your chances for getting a job. (REFLECTING MEANING AND FEELINGS)

Kate: Yes, but I feel a little better now. Thanks for letting me talk about it.

No problems were solved in this conference. Kate still had her C and she probably was still not happy about it. What did happen that was helpful for Kate? First, the supervisor conveyed an acceptance of Kate that was not contingent upon her competence of her performance. The message was, "You're OK, and it's OK to have all those feelings about your evaluation." Second, the supervisor communicated understanding of Kate's feelings, particularly when she reflected Kate's feelings that "it isn't fair." From the point of view of the supervisor and the cooperating teacher, the evaluation was "fair;" that is, it accurately reflected Kate's performance. But from Kate's point of view, it did not seem "fair," and the supervisor showed that she understood that feeling.

Third, by "leaving the ball" with Kate, the supervisor provided the climate for Kate to clarify her thoughts and to assume responsibility for dealing with her feelings. Very likely, Kate knew that the evaluation was accurate. Perhaps she regretted not having made a greater effort and was embarrassed to have appeared less than competent. These kinds of feelings influence a person's self-esteem and they are often accompanied by defensiveness. Once Kate had released her defensive feelings about

"fairness," she began to acknowledge that "things had not gone so well." Had the supervisor tried to objectively discuss the items on the evaluation to convince Kate that it had been fair (to satisfy the supervisor's needs), it is likely that Kate's defensiveness would have increased, and then little useful self-introspection would have occured.

One other important result of this conference was the personal growth of the supervisor. Below is a description of her feelings and reactions to the conference.

> I had been reading about facilitative skills and had practiced them in role plays, but I hadn't yet felt comfortable or natural about trying the skills with my own students. During the final conference with Kate and her cooperating teacher, I recognized that Kate had a lot of negative feelings, but I guess I was afraid to Actively Listen with the cooperating teacher there. Later, I really regretted not being more helpful to Kate, so I set up another conference with her. I was pretty apprehensive about the whole thing--this was no role play--this was real. I actually rehearsed some things I might say at the beginning to encourage her to talk about it!
>
> When she didn't start talking after my first two attempts, I didn't know what to say next. I just sat there. The silence made me uncomfortable. And then she did say something! I had already thought about some of the possible feelings she might be having--anger, resentment, disappointment--so it wasn't too difficult to reflect her feelings. But I wasn't prepared for the tears! I

thought, "This is a mistake. I'm just upsetting her more." I could tell that I was getting closer to the real feelings as I ran through "disappointment" and "not being appreciated," but she still hadn't opened up. Then I really hit on true feelings when I reflected, "not fair." I had been told that when the reflection of feelings was accurate, I would know it from the other person's reaction. But I was really surprised at how strongly Kate reacted with "yes!" and a torrent of tears. I actually felt relieved, but I didn't know where to go from there. While I let her cry, I reminded myself, "just keep reflecting."

I was really surprised at how things went after that. I had predicted that Kate would want to challenge her rating on some of the evaluation items. I was prepared for her to defend her performance and perhaps to criticize the cooperating teacher and me. I had prepared myself to try to be nondefensive and to Actively Listen a lot so that she would be able to think about her skills somewhat objectively. But that didn't happen! Instead, she became more relaxed and admitted, in general terms, that she had not performed very well. She kept repeating that she had "really tried"--maybe that was true from her point of view. I really had to resist a Roadblock here, like "I'm sure you tried, but not hard enough," or "Sure, you did some good things, that's why you got an "average" grade. But you have to do a lot more than you did to earn an A." In retrospect, I can see that the actual evaluation was a side issue. She needed for someone to understand that she had not just been irresponsible--that it had

been hard for her--and to recognize her competence in another area. She even said it, "I can be a good teacher." It also came out that she was worried about getting a job. If we hadn't talked, I don't think she would have asked me for a letter of recommendation. I really learned a lot from my conference with Kate. It was quite a struggle to let go of the inclination to impart my supervisory "words of wisdom" and to concentrate instead on what her feelings might be. But the moment I remember most vividly was when she finally released all the emotion. Strange as it may sound, the more skilled I become, the more tears I see! And now a lot more problems come out early instead of only at "finals time."

Active Listening is not only for "heavy" situations like the one just illustrated. It is useful wherever feelings occur. Feelings underly most of the verbal and nonverbal messages people send to one another, and this is particularly true in the classroom where pressures and fears about learning, competence, acceptability, and control exist for both teachers and students. For a teacher who wants to facilitate a nonthreatning environment for personal growth and learning, Active Listening skills are immensely important throughout the school day. Some examples of brief, facilitative instances are given below. Most of the examples are from diaries of teachers who were just learning Active Listening skills.

The class was working on individual math assignments. Sam had sharpened his pencil three times, and then, chin in hand, was staring out the window. He gave an exaggerated sigh.

Teacher: (hand on Sam's shoulder, smiling) It's really hard to get settled down to work today. (REFLECTING FEELINGS FROM NONVERBAL CLUES)

Sam: Yeah.

Teacher: You'd like to be outside. (REFLECTING MEANING)

Sam: Yeah. I'm going to have a birthday party after school.

Teacher: I'll bet it's hard to concentrate on math with that party coming up. (REFLECTING FEELINGS)

Sam: Yeah. It's my brother's party and I blew up all the balloons.

Teacher: You're so excited, you just can't wait! (REFLECTING FEELINGS)

Sam: Yeah! Mom's picking me up just as soon as school's out!

Teacher: It's really hard for you to work right now. (REFLECTING MEANING) What would you like to do about your math assignment? (GIVING SAM RESPONSIBILITY IN PROBLEM-FREE AREA)

Sam: Do I have to do it?

Teacher: Sooner or later.

Sam: (sigh) I guess I'll do it now. (Sam gets back to work.)

Other priorities besides learning seem to be a natural phenomenon in classrooms, and it is a teacher's job to overcome this whenever possible. By acknowledging that sometimes it is hard to concentrate, Sam's teacher learned what was distracting Sam. He did not make Sam feel that he was "bad." He even managed to give the responsibility for doing the assignment to Sam.

In the next example, the teacher needed to use only one reflecting statement to diffuse strong feelings. Think about how a Roadblock might have precipitated a full class period of tension between the student and the teacher.

Terry: (enters room, slams books down with a loud crash, stomps up and down a few times) Boy, I feel LOUSY today!

Teacher: Things aren't going too well for you this morning. (REFLECTING MEANING, ENCOURAGEMENT TO TALK)

Terry: Yeah. (Walks over to teacher and leans against the microscope cabinet.) First thing this morning, my girlfriend tells me her car is wrecked.

Teacher: Was she hurt? (CLARIFICATION)

Terry: No, but the other guy's in the hospital.

By this time, the class had gathered around and several students helped tell the story. A motorcycle rider had run into Terry's girlfriend's car on the student parking lot and was apparently seriously injured.

This teacher commented, "The discussion of the incident seemed to relieve tension for both Terry and the class. My door opener was all that was needed. A few questions here and there kept the talk going until everyone apparently felt better. Then we started class." The teacher was prepared to Actively Listen for a while to Terry, but the one reflective statement encouraged Terry to talk, and that was all he needed. The teacher's actions conveyed interest, concern and caring. Little did she know, at the outset, that her interest in Terry's problem would be facilitative for the entire

class! Far more time and energy would have been used keeping the class quiet that hour than the few minutes she "spent" in letting the students "talk it out."

Lots of negative feelings can come out at "grade time." In the next example, the teacher decided to Actively Listen after handing out grades. Marsha got a D, but had hoped for a C. The teacher explained that the grade was not a C because of points lost on incomplete lab write-ups.

Marsha: (looking glum)

Teacher: Labs are hard sometimes. (REFLECTING MEANING)

Marsha: Yes, I can't figure out what to do in write-ups.

Teacher: You feel frustrated when you can't figure out what to do. (REFLECTING FEELINGS)

Marsha: (brightening up; surprised) Yeah! I just don't know what to do! But it's all problem solving and I should learn how to do it.

Teacher: Well, it's my job to make these things understandable. If you have any suggestions about making them easier, let me know. I know the answers and sometimes it's hard for me to know what is hard for you to understand.

Marsha: (laughed and agreed)

The teacher commented in her diary, "We stood there admiring each other for a few seconds, and since neither of us could think of anything else to say, conversation terminated." Marsha was surprised to hear her teacher reflect her feelings of frustration with lab write-ups. Just a little Active Listening yielded positive results. Marsha began to perceive her

teacher in a new light-- her teacher understood, cared and was willing to help. Very likely, the teacher then felt closer to Marsha and became more alert to giving her some special help. Teachers also feel frustration when students do not learn. Establishing positive interpersonal ties can help make classroom interactions more pleasant for teachers, too!

The following two examples are from the diary of a fifth-grade teacher who was having her first experiences with Active Listening.

> Kim is in fifth grade and has difficulty with cursive handwriting. Thus, he prints most of the time. I have tried in many ways to get him to write, but he still resorts to printing his words. I had been using roadblocking statements, such as, "You can learn to write; you're just too lazy," or, "You'd better learn to write if you want to be promoted to the sixth grade." These types of statements never produced any positive results. Kim seemed to resist even more when I used such statements. When I learned about Active Listening, I decided to try it as a means to get Kim to open up and talk aobut his problem. This is how the conversation went:
>
> Teacher: Kim, would you like to talk about why you don't like to write in cursive? (INVITATION TO TALK)
>
> Kim: I can't write in cursive. It's just too hard.
>
> Teacher: It is really a difficult task to learn to write. Printing seems so much easier. (REFLECTING MEANING)
>
> Kim: Yes. When I write, I have to think real hard about how to connect the letters, and that takes just too much time.

Teacher: Writing seems to involve more time and skill than printing does. (REFLECTING MEANING)

Kim: I can write if I really take my time. But you only give us 30 minutes to do our work. I can print faster than I can write.

Teacher: I don't give you enough time to finish your assignments when cursive writing is used. (REFLECTING MEANING)

Kim: Yes. And the other kids can't read my writing anyway. They're always laughing at me when I write on the board. They call my writing "chicken scratch."

Teacher: You don't like the other students laughing and making fun of your writing. (REFLECTING FEELINGS)

Kim: I wish I could learn to write better so they wouldn't laugh at my writing. Can you give me some handwriting sheets to take home? I want to practice writing at home.

Teacher: I sure can, Kim. I'm happy to find out that you really care about your writing. (REINFORCING KIM'S INITIATIVE)

I have given Kim handwriting sheets to take home may times since then. He doesn't always bring them back, but when he does and he lets me look at them, I can see some improvement in his handwriting both on these sheets and in his daily assignments.

I feel that this Active Listening session helped Kim to be aware that I wanted to understand him and find out what his feelings were toward handwriting.

Even though this situation may not have been important to anyone

else, it was important to Kim. By listening to him, Kim expressed some feelings toward writing that he had not expressed in other situations. And even though Kim's problem is still not solved, his feelins have been aired; he is aware that I tried to understand his feelings; and he is trying harder to solve his problem on his own.

Andrew moved to our school district a few months after school began. At first he was a very quiet and mannerly child, did his school work, and got along fairly well with other students. A few weeks ago, he seemed to change overnight. He became very belligerent and rude; he wouldn't do his school work; and the other children didn't want to talk to him or be around him anymore. I knew something drastic must have happened in his life to change his attitude. So one day when he was sitting there not doing his work, I decided to use Active Listneing to help him reveal his feelings.

Teacher: Andrew, do you want to talk about why you're not doing your school work? (INVITATION TO TALK)

Andrew: I just don't feel like doing it.

Teacher: You're so tired when you come to school that you don't feel like working. (REFLECTING MEANING, BUT GUESSING)

Andrew: I have to do a lot of work at home before I even get to school.

Teacher: Doing so much work makes you tired before you even get to school. (REFLECTING MEANING)

Andrew: Yes. (long pause)

Teacher: What kind of work do you have to do, Andrew? (CLARIFYING QUESTION)

Andrew: I have to feed the chickens and the pigs and bring in wood. My uncle is there, but he doesn't even try to help me.

Teacher: You feel like your Uncle could lend you a hand sometimes. (REFLECTING MEANING)

Andrew: Yeah, then I won't be so tired. I have to get up early to get all those things done before school. I don't feel too good when I get here.

Teacher: After all that work at home, you just don't want to work any more when you get to school. (REFLECTING MEANING)

Andrew: Not really. I can't do the math work too well. And I can't read too good. Some of the kids laugh at me when I read and I don't like that.

Teacher: Since you can't do the work well and other kids laugh at you when you try, you're not going to do any work. (REFLECTING MEANING)

Andrew: Yes. I'm going to beat up those kids if they don't stop calling me dumb. I can't read that good, but that's no reason for anyone to make fun of me.

Teacher: When the other students make fun of you, you get really angry. And you just quit trying because you don't want them to laugh at you. (REFLECTING FEELINGS AND MEANING)

Andrew: Yeah.

Then it was time for my next group to come in, so Andrew went back to his home room. But from this Active Listening session, I found out why Andrew was behaving as he was, and I think he felt a little better by expressing his feelings openly to me.

Of course the problem of his not doing his work was not solved, but I did get better acquainted with his feelings by Actively Listening. And I think Andrew realized that I really was trying to understand his feelings.

Exercise Set 5

1. For each statement given below which indicates that the other person may be upset, an incomplete Active Listening response is given. Fill in the blanks so that the response reflects the other person's feelings or meanings.

   a. "I haven't taken a test in years and years."

   Listening Response: "After all that time, you're a little _____ about how well you can _____."

   b. "I never get picked to be a pitcher. This is a dumb game, anyway!"

   Listening Response: "It's really _____ to work so hard on your _____ and then not to get to pitch in a game."

   c. "I don't feel like giving my book report today. I just found out I flunked my math final."

   Listening Response: "The math final is still on your mind. It's kind of hard to _____ giving a book report when you feel so _____ about flunking a math final."

2. For each statement below which indicates that the other person may be upset, write an Active Listening response which reflects the other person's feelings. The response may also reflect meaning.

   a. "If you thing I'm going to stand up there in front of the class and make a fool of myself, you're crazy!"

   Active Listening Response: _____

   _____

   b. "I don't see why I should knock myself out on this paper. You never give useful comments, just checkmarks."

   Active Listening Response: _____

   _____

c. "This course is for the birds! I can't use any of this stuff in my job!"

Active Listening Response: _____

_____

d. "No one cares what I have to say! They always treat me like I'm some kind of dummy."

Active Listening Response: _____

_____

e. "I don't want to go out to recess! I hate it!"

Active Listening Response: _____

_____

3. The following is a coversation between a student (Mr. Sims) and an instructor who was Actively Listening to Mr. Sims, who has been considering enrolling in a TV repair course. Fill in possible Active Listening responses for the instructor.

Mr. Sims: I don't think I'd do so well. I'm pretty good with my hands, but I probably couldn't pass the written work.

Instructor: _____

Mr. Sims: Yes. I always used to freeze up on tests when I was in high school. I'd usually know the answer, but I never could write it down so well.

Instructor: _____

Mr. Sims: Yeah, the teachers didn't think I knew much, but I knew a lot more than showed up on the tests. Tests just scare the hell out of me. I really want to do

this thing; but, in a way, I wonder why I should spend my money when I know the tests are going to do me in. (pause) But I could do the repair work. I know I could! And I really want to go into that line of work.

Instructor: _____

Mr. Sims: Yeah. I guess I do want it a lot. Maybe I'll just have to give it a try, and if it doesn't work out, well, at least I've tried.

Instructor: _____

Mr. Sims: Yes, it really does mean a lot to me. This is the only way I can get into the business, so I guess I'd better just go ahead and see what happens. And I'll hope for the best on the tests.

Instructor: _____

Mr. Sims: Yes, it really is that important to me. If I don't take the course, I'll never get where I want to be. I guess I'll just have to try super hard when it comes to the tests.

Instructor: Well, I guess you're determined to give it a try. If I can be of any help to you, just let me know.

Learning to Actively Listen

Becoming skilled at Active Listening takes serious effort over time. For most people, it requires breaking certain life-long habits of responding to others while simultaneously practicing new responses which are more facilitative. As the examples in this section illustrate, the process of Active Listening is complex because it requires "thinking on one's feet." There is a certain sense of security in acquiring a repertoire of standard responses like, " I like the way John is raising his hand," or "When you are ready to work, I'll help you," which seems to "work" in a variety of situations and these responses are often very useful. However, the process of Active Listening can be more powerful because it "individualizes" communication because each response reflects the immediate thoughts and feelings of the other person.

Learning to Actively Listen requires practice and perseverance. The following list of suggestions comes from the author's personal experiences and from the experiences of teachers and others who have shared their reactions and feelings while learning to become interpersonally facilitative.

Suggestions for Becoming an Active Listener

- Be genuinely committed to a humanistic perspective.

Active listening is not just a verbal technique where thoughts and feelings are objectively analyzed and rephrased. One can learn the mechanics of facilitative listening, yet fail completely at conveying empathy and understanding. Caring arises from beliefs about other people and about one's self. Practicing and internalizing facilitative verbal and nonverbal responses must be motivated by a sincere desire to communicate such attitudes and beliefs.

Several studies were conducted at the University of Florida and the University of Northern Colorado to investigate the differeces between good teachers and poor teachers with respect to their personal beliefs (Combs, Blume, Newman & Wass, 1974). Good teachers were distinguished from poor teachers on six dimensions of how they viewed other people.

Able--Unable. Good teachers perceive others as having the capabilities to deal with their problems successfully. They believe that people can find adequate solutions, as opposed to doubting the capacity of people to handle themselves and their lives.

Friendly--Unfriendly. Good teachers see others as being friendly and enhancing. They do not regard them as threatening. They see others as essentially well-intentioned rather than evil-intentioned.

Worthy--Unworthy. Good teachers tend to see other people as being worthy rather than unworthy. The see them as possessing a dignity and integrity that must be respected and maintained rather than seeing them as unimportant, as people whose integrity may be violated or treated as of little account.

Internally--Externally Motivated. Good teachers see people and their behavior as essentially developing from within rather than as a product of external events to be molded and manipulated. People are seen as creative and dynamic rather than passive or inert.

Dependable--Undependable. Good teachers see people as essentially trustworthy and dependable in the sense of behaving in a lawful way. Their behavior is regarded as understandable rather than capricious, unpredictable or negative.

Equally important are the beliefs that good teachers hold about themselves.

1. Good teachers feel identified with, rather than apart from, others. They tend to see themselves as a part of all mankind; they identify with people rather than being withdrawn, removed, apart, or alienated from others.
2. Good teachers perceive themselves as adequate rather than inadequate. They believe they are capable enough to deal with their own problems. They do not view themselves as lacking and unable to cope with problems.
3. Good teachers think they are trustworthy rather than untrustworthy. They believe that other people can trust them. They see themselves as essentially dependable, and reliable, and having the potential to cope with events, rather than doubting their own potentiality and reality.
4. Good teachers see themselves as wanted rather than unwanted. They are essentially likeable, attractive (not in the physical sense), wanted, and in general capable of bringing forth a warm response from those people important to them. They do not feel ignored, unwanted, or rejected by others.
5. Good teachers perceive themselves as worthy rather than unworthy. They see themselves as people of consequence, dignity, integrity, and worthy of respect as opposed to being people of little consequence who can be overlooked, discounted, and whose dignity and integrity do not matter.

One way to begin to become more facilitative is to first carefully examine your personal beliefs about people and about yourself in comparison to the above two lists of beliefs.

A total commitment to such beliefs is not entirely necessary to begin to learn new interpersonal skills. It is sufficient to wish that you could hold such beliefs, or at least many of them. Strong commitment to a belief usually comes from the experience of seeing that the practice of that belief "works." As your skills increase, and you experience positive results, then your commitment to these kinds of beliefs will increase also. What is important is to be aware that your facilitative behaviors will be perceived as genuine only if they reflect your true attitudes toward people and the beliefs that you hold about teaching, learning, human behavior, and your role as teacher and as a person.

- Work on your awareness. Begin to look for Roadblocks sent by yourself and other people. Make conjectures about the effect the Roadblock might have on the other person. Thing about a facilitative response that might have been given instead. Notice the behaviors of yourself and others in conversations. Are people really attending to what is said? Begin to think about the "hidden" meanings and feelings in the things other people say. John has just failed to qualify for a track meet. He says, "Track is for the birds!" Does he really mean track is worthless? What are his feelings? Notice how you help students or others solve their problems. Could you have helped the other person solve his or her own problem, or did you try to solve it

for them? What could you have done or said? Observe yourself as you interact with others in problem situations. Are your actions consistent with or contrary to the beliefs you would like to hold about yourself and other people?

- Find opportunities to begin to practice facilitative responses. Many teachers have reported beginning to Actively Listen to friends, relatives, and even to strangers. See what happens when you comment to a harried check-out person at a supermarket, "It's pretty hectic today, huh?" One teacher wrote in her diary, "Actively Listened to my husband's grandmother over the telephone one evening. She was going on about how everything went wrong for her that day. All I did was parahrase back some of the things she said to me. She would then agree back with me. I think she felt good to tell someone what she was feeling before she went to bed that night."
- Be genuinely involved from the other person's perspective. Genuine involvement is the key to being a facilitative listener. The listener must really care about the other person's feelings and attend fully to what is being said verbally and nonverbally, At that moment, let yourself be totally involved with the other person's needs and let go of your own needs. Do not let yourself become defensive. Do not let your mind race ahead for solutions, judgements, or conclusions. Involvement is the necessary precondition for all good listening.
- Expect old habits to die slowly. Do not be overly discouraged if you find yourself using Roadblocks or failing to take advantage of opportunities to Actively Listen. It takes time for attitudes to

change. Be willing to think about what occurred and be open to going back to the person and to "try again." A high school teacher reported the following "recovery:"

> I seem not to realize my own use of Roadblocks until after the event has transpired. For example, a student in one of my classes did not turn in a required composition when it was due. She came up to me after class and started making weak excuses (at least it seemed so to me at that time) for her failure in completing the assigment. Without a moment's hesitation, I cut her off with a brusque statement, "Quit making excuses. Turn it in tomorrow with one letter grade off." She left quickly and I realized what I had done. It took me until the next period to track her down and apologize (it felt good). After talking and Actively Listening with her for a while, she decided it was nothing but laziness on her part for not turning in the assigment (sounds like my excuses!), and she stated that the one letter grade a day "penalty" was a reasonable idea. Needless to say, we both left that conversation in a much better frame of mind than when we left the earlier conversation.

- When you sense that your Active Listening is not well received, analyze what occurred. For many people, it is risky to Actively Listen, because the attitudes and behaviors involved might not feel "natural" at the beginning. Learning interpersonal skills can be a little like learning to drive a car--all the rules and skills just do not automatically come together at first. A new driver sometimes slams on the brakes,

forgets to signal for a turn, or even runs into curbs, trees and cars! But the new driver does not then conclude that driving "doesn't work." In fact, making mistakes often leads to pretty rapid learning, once the mistake is analyzed. The following list gives a few points to consider when you reflect on an "unsuccessful" attempt to Actively Listen.

Was the other person really involved in a problem? One parent who was learning facilitative skills reported that Active Listening didn't "work" with her son. Their conversation had gone something like this:

Dan: Hi, Mom. When's dinner? I'm going to be late for rehersal.

Mom: You're afraid that you'll be late for rehearsal. (REFLECTING FEELINGS)

Dan: Yeah, that's what I said. When's dinner?

Mom: You want me to get dinner on so you won't be late. (REFLECTING MEANING)

Dan: (looking puzzled) Yeah. Watch my lips this time, Mom. (slowly and deliberately) I'd--like--to--eat--soon--so--I--won't--be--late.

Mom: You think I don't understand how important it is to be on time. (REFLECTING FEELINGS)

Dan: (throwing hands up) Man! What's wrong with you? Just forget it. I'll skip dinner! (storms out)

What went wrong? Dan's mother tried to Actively Listen in a problem-free situation. Dan was not upset by a problem, but he is now! When reflective listening is falling flat, it may be because no problem exists for the other person.

Active Listening has been stressed for problem situations, but it also is worthwhile in situations where there are happy feelings. For

example, a child says, "My little brother started walking today," and her teacher reflects, "You're really proud of your little brother." The teacher was "right on" with this response as told by the child's delighted expression. Listening is a universal skill.

Was the other person's meaning rephrased or simply "parroted?"

Another parent reported to a group that Active Listening did not "work" with his daughter--it just made her more angry.

Sarah: (angrily) Will you tell Mom to get off my back?

Dad: You want me to tell Mom to get off your back. (PARROTING)

Sarah: Yeah. I'm going to go crazy if she doesn't stop bugging me.

Dad: You're going to go crazy if she doesn't quit nagging. (PARROTING)

Sarah: Dad, can't you do something?

Dad: You want me to do something. (PARROTING)

Sarah: (in frustration) Will you please stop repeating everything I say?

Did the emotion of your response match the other person's emotion?

Imagine that a student comes up to you and says, "You can just go to hell!" Suppose you respond very gently and quietly with, "It sounds like you're just a little upset with me right now." The student's feelings have been greatly understated, and, therefore, not accurately reflected. Such a response could be received as condescending or not genuine. Better to say, with strong emphasis, something like, "Man! You are really mad!" Part of the empathy is genuine involvement to the extent of almost feeling the other person's emotions.

Did you misinterpret your OWN problem as the other person's problem?

Suppose you are really angry because a student habitually chats all the

way through your instructions for seatwork and you finally have "had it." Suppose you are frustrated with the test results of a student who has ability, but seems to be content with making C's. It is crucial to be able to recognize that when you are the one with upset feelings, the problem is yours, not the student's. Indeed, there are facilitative ways to communicate when you are upset. However, if Active Listening seems to fail in situations like these, it is important to be able to recognize that it probably is because the upset feelings are yours, not the student's.

Did you expect to establish a new relationship with another person instantaneously? It is common for teachers or parents to report that they Actively Listened and "nothing happened." The youngster did not respond or the youngster replied with a "smart remark."

It takes a while to establish mutual trust. People are not accustomed to having others listen, really listen, to them. While some may respond immediately, others will need to experience repeated and consistent caring behaviors before they will risk revealing more information about their thoughts and feelings. Have patience!

Even though it may be difficult at times to see what effect your Active Listening has had, be certain that the other person did take notice of your interest and the absence of Roadblocks. A stronger relationship is on the way!

SUMMARY

A primary goal for teachers is to help students learn. When students are upset, learning is difficult. Teachers can develop listening skills which contribute to a healthy atmosphere for learning, which strengthen student-teacher relationships, and which foster students' personal growth.

It is one thing to understand the content of this chapter and to be able to accurately reflect the ideas in a discussion or on a test. It is quite another thing to put the ideas into practice and to become an Active Listener. Understanding and awareness are important first steps toward becoming more skillful, but the crucial step is to take action--to begin trying to listen and respond skillfully on a day-to-day basis. We suggest that you begin today,and that you occasionally review the ideas in this chapter, particularly the section "Learning to Actively Listen." Listening is a life-long process! It can alter how you feel about yourself, and it can alter how others feel about you. It is worth the time, patience, and effort to develop a skill that enables you to place yourself in someone else's shoes for a while and to see how the world looks to that person.

> Could a greater miracle take place
> than for us to look through each
> other's eyes for an instant.
>
> -Thoreau-

Henry David Thoreau, Walden, 1973. New York: Milestone Editions, p. 15.

Answers to Exercise Set 1

1. a. Persuasive Response: reassuring

   b. Directive Response: warning, threatening

   c. Persuasive Response: moralizing, "shoulds and oughts"

   d. Evaluative Response: analyzing, interpreting

   e. Evaluative Response: praising

   f. Evaluative Response: ridiculing, labeling. Also, Directive Response: threatening

   g. Questioning Response: interrogating

   h. Questioning Response: probing

   i. Directive Response: ordering, commanding

   j. Solution Response: advising

   k. Avoidance Response: sarcasm

   l. Directive Response: ordering, threatening

   m. Persuasive Response: logical argumnet, lecturing

   n. Persuasive Response: moralizing, preaching

   o. Emphasizing your own needs

   p. Avoidance Response: withdrawing

   q. Avoidance Response: diverting

2. Examples of some typical Roadblocks are given.

   a. Avoidance Response: sarcasm

      "Who's giving this report, you or your father?"

      "If your father wants to run this class, I'd be glad to let him try it for a few days."

Directive Response: warning, threatening

"If you don't read the report, you'll get a zero for it."

"The assignment was an oral report. If you don't read it, you don't get credit for it."

Persuasive Response: reassuring

"Al, it's no big deal to read a report. Come on, now, you'll do just fine."

"Aw, Al, you've read in front of the class before. You've always done just fine."

Persuasive Response: logical argument

"If I grade you just on the written paper, everyone else will want to be graded just on the written work."

"Al, these people are all your friends. You have to learn to speak in front of a group sometime, and now's a good chance to practice."

Evaluative Response: judging, criticizing

"Don't think you can get out of this by hiding behind your father. I don't like students to threaten me like this."

"If you're too lazy to read that report, fine. But don't bring your father into it."

b. Persuasive Response: reassuring

"Sure, you'll pass. The written work isn't all that hard."

"Oh, you can do it. You'll get through just fine."

Persuasive Response: logical argument

"Look. The tests in those courses are just about the equipment. If you know how to repair a set, you can answer all the questions."

"They want good repairmen coming out of those courses. They're not going to flunk you from the tests if you can really do a good job."

"You have to decide whether you want to go into the business or not. If you do, you don't have any choice anyway about taking that course."

Solution Response: offering suggestions

"Don't even think about the tests. Just go in there and do your best."

"Talk to the instructor. If they like you, they'll help you out with the written work."

Persuasive Response: giving shoulds and oughts or preaching

"Look, if you really want to be a TV repairman, you'll go in there and you'll pass those tests."

"You shouldn't put yourself down because you think you don't write well. You should just go in there and tell yourself you're going to do it."

Evaluative Response: criticizing

"You're always finding some excuse for not going ahead with this. I don't think you really want to become a repairman."

"Excuses, excuses!"

"If you'd study for those tests, you could pass them."

Evaluative Response: praising

"You're a reasonably intelligent fellow. You won't have any problems."

"I've never known you to fail at anything you really want to do. You're not that kind of person."

Avoidance Response: diverting or withdrawing

"I felt like that once, and I..."

"Well, you'll find out when you get in there. Let's talk about something else."

"Let's just forget about that course right now and watch the game."

Questioning Response: forced choice question

"Do you want to be a repairman or don't you?"

"Do you want to worry yourself silly or do you want to just do it?"

3. Read over the section in the text on the four types of questions to see if you have the right idea of why each question is not facilitative.
4. One of our students said he tried to alwaysmake sure the person had finished what the person wanted to say before he said something. Another student would remind herself of how angry she would get sometimes when someone would interrupt her.

Answers for Exercise Set 2

1. Paraphrase: You put a lot of time in on your papers and it seems like I don't read them very carefully.

   Paraphrase: When you spend that much time on a paper, you'd like to have more specific feedback.

2. Paraphrase: You don't see how this course applies to what you do at work.

   Paraphrase: You're looking for ideas you can use on the job.

3. Paraphrase: It seems like no one is listening to you.

   Paraphrase: They make you feel like your ideas are dumb.

4. Paraphrase: You want to stay in the room.

   Paraphrase: You don't like recess.

5. Paraphrase: No one at home shows much interest in your schoolwork.

   Paraphrase: You don't talk with your folks much about your problems in school.

6. Paraphrase: You don't want to love another dog and then have to lose it someday.

   Paraphrase: You would be thinking about how the new puppy would grow up and then die someday like Muffin.

7. Paraphrase: Your dad feels the same way you do.

   Paraphrase: You'd like to be graded on the written report, and you don't want to give it in front of the class.

8. Paraphrase: You think the written work might be pretty tough for you.

   Paraphrase: You think you could do pretty well if it weren't for the written tests.

Answers -- Exercise Set 3

1. The teacher's purpose here could have been to persuade the student to give her decision some more thought when she was less upset. But persuading and advising are Roadblocks when a person is upset. The student probably thought the teacher didn't understand or was patronizing her. She might have thought that the teacher didn't give her credit for having enough sense to make a decision, or that the teacher was implying that she was making a foolish decision. The teacher's response might have even seemed like a put-down. A typical response from the student would have been, "I don't need to sleep on it. I've already made up my mind." And the student would probably have had no desire to continue talking about it.
2. As upset as the student was right then, this question was too probing--a Roadblock. The teacher probably just wanted to hear more about all the things that were bothering the student, but the teacher was rushing the student and taking over the direction of the conversation. An upset person needs to just let out feelings spontaneously without having to stop and think about the answer to a question. Perhaps the teacher was very perceptive in guessing that the most upsetting problems were at home, but with some good listening, that would come out if it really were the case. The student's frustration at that moment could have been primarily with the registrar, with her husband, with herself, or with some other situation that hadn't even come out yet. With

this question, the student essentially had two choices: (1) to think about how to avoid answering the question or (2) to talk about problems that weren't really relevant or that she might not have felt comfortable explaining. Of course, there is a chance that she did want to talk about it right then, but we don't think that the risk of (1) or (2) occurring is worth the probing.

One possible reaction to a probing question is a feeling of suspicion. "Why did he ask that? He thinks I'm upset about school because of problems at home. Now he's going to play psychologist and analyze me." People are accustomed to hidden meanings and purposes in other people's questions.

3. This is a clarifying question. It's purpose is simply to identify a person the student mentioned. The teacher probably thought that the reference to John had to do with marital problems, but he wasn't sure. The question was not threatening and could have been answered with a simple "yes" or "no, he's my son," for example. The student had the option of elaborating if she had wanted to, but the question itself didn't force her to talk about (or refuse to talk about) her husband. After the student's response, the teacher could have simply said, "OK" or "uh-huh," and let the student continue. If the student had any reaction at all about the question, it probably was that the teacher was listening carefully and wanted to understand what she was saying.

4. This is a good example of a "forced choice" question which is also a "double bind"--a Roadblock. Which would you prefer admitting to: wanting to quit or making a mountain out of a mole hill? The purpose of the question was really to suggest that the student might be "catastrophizing" the

whole situation--perhaps a healthy thing for the student to have considered when she had calmed down, but very apt to put the student on the defensive while she was still upset. The student might have just quit talking because she wanted to be understood, not to defend herself.

5. This is a clarifying statement, and a better one than the question in #3. The student had focused on the registrar by saying, "the thing with the registrar really did it," so this seemed to be a crucial point. The teacher's statement conveyed that he had listened carefully and wanted to understand completely. It was a request for more facts about something that the student had volunteered as important. She had a nonthreatening option here to say, "oh, that isn't very important," if indeed it was not. The teacher's statement might seem similar to asking the question, "what happened with the registrar?," and indeed it is, but we still maintain that there is a psychological difference because people are conditioned to feel compelled to answer questions. Probably, the student's reaction was positive, because she knew the teacher wanted to listen and was inviting her to elaborate.

6. This is a summarizing statement. It was a concise paraphrase of everything the student had said. The teacher's purpose was to let the student know that he had listened carefully. He did not interject any of his opinions or advice, and he did not take the ball away from the student. This student seemed to be in a state of chaos with all her problems. She was blurting out facts and

Answers to Exercise Set 4

1. Sad

angry	disturbed	insecure	powerless
anguished	downcast	left out	rejected
apathetic	downhearted	lethargic	remorseful
blue	dreary	lonely	somber
burdened	embarassed	lost	sorrowful
crushed	forlorn	low	sorry
deflated	gloomy	melancholy	trapped
dejected	glum	miserable	troubled
depressed	grieved	misunderstood	unappreciated
despairing	guilty	moody	uncomfortable
despondent	helpless	morose	unhappy
disappointed	hopeless	mournful	unloved
discouraged	hurt	negative	unpleasant
disenchanted	inadequate	neglected	unwanted
dismayed	incapable	painful	upset
distressed	inferior	plaintive	woeful

Mad

aggravated	distressed	hostile	perturbed
agitated	disturbed	incensed	provoked
angry	enraged	indignant	raving
annoyed	exasperated	infuriated	resentful
blustery	fed up	intense	revengeful
burned up	fierce	irate	riled
cross	fiery	irked	seething

Mad (cont.)

defensive	flustered	irritated	sore
disgruntled	frenzied	livid	spiteful
disgusted	frustrated	mean	stormy
displeased	furious	miffed	upset
distraught	hateful	outraged	

Glad

amused	ecstatic	loved	relieved
appreciated	elated	loving	satisfied
blissful	enthralled	lucky	secure
bubbly	excited	marvelous	thankful
calm	exuberant	merry	thrilled
capable	gay	overjoyed	together
cheerful	glad	peaceful	tranquil
competent	gleeful	playful	understood
confident	happy	pleasant	up
content	joyful	pleased	vibrant
delighted	jubilant	proud	wonderful

Afraid

afraid	edgy	panicky	timid
anxious	fearful	panic-stricken	tormented
alarmed	flustered	perplexed	uncertain
apprehensive	frantic	petrified	uneasy
awed	frighteded	puzzled	unsettled
baffled	harassed	rattled	unstrung
bewildered	horrified	shaky	uneasy

Afraid (cont.)

botherd	insecure	shy	unsure
confused	intimidated	startled	wavering
distrustful	leery	stunned	worried
doubtful	mistrustful	terrified	dreadful
nervous	threatened		

2. a. apprehensive, anxious, insecure, worried
   b. rejected, disappointed, hurt, inferior, unwanted
   c. sad, disappointed, inadequate, discouraged
   d. competent, satisfied, proud, pleased, confident
   e. threatened, afraid, insecure, fearful
   f. angry, frustrated, furious, upset
   g. annoyed, disgusted, irritated, aggravated
   h. turned off, resentful, displeased, annoyed
   i. frustrated, defensive, confused, unsure
   j. rejected, neglected, misunderstood, inadequate
   k. afraid, anxious, apprehensive, frightened, worried
   l. insecure, unloved, resentful, neglected, discouraged
   m. afraid, confused, lonely, unhappy, depressed
   n. afraid, nervous, anxious, defensive
   o. apprehensive, insecure, anxious, uncertain

Answers to Exercise Set 5

1. a. After all that time, you're a little apprehensive/anxious/worried about how will you can perform on a written test.

   b. "It's really disappointing/a let down/frustrating to work so hard on your pitching/game and then not to get to pitch the game."

   c. "The math final is still on your mind. It's kinda hard to concentrate on/be interested in giving a book report when you feel so disappointed/shocked about flunking a math final."

2. Several responses are given for each statement. There are many possibilities. Check your responses to see if most of them included a feeling word.

   a. "You're really afraid that you will sound foolish."
   "You think the other students might make fun of you."
   "You feel uncomfortable about doing this."

   b. "You resent doing all that work when it looks like I don't care enough to make some specific comments."
   "You've worked so hard on your paper. You are annoyed when it looks like I haven't spent much time reading it."

   c. "You're not sure about how this applies to what you're doing in your job."
   "It's frustrating to do all this work when you don't see any payoff for you in your daily work."
   "You don't see how this course applies to your job, and that's beginning to frustrate you because you had other expectations."

   d. "You feel like people don't understand what you're trying to say."
   "It seems like people are rejecting you because they don't listen."
   "No one seems to listen. You think they don't respect your opinions."

e. "You'd like to stay in the room. It isn't any fun to go to recess." "You want to stay here because bad things are happening at recess." "Sometimes recess is a little scary. It seems safer to stay in the room."

3. Mr. Sims: I don't think I'd do so well. I'm pretty good with my hands, but I probably couldn't pass the written work.

Instructor: You think you could do all right with the repair work, but you're uncertain about the written tests.

OR

It's really hard sometimes to have to put things you know how to do into words.

Mr. Sims: Yes. I always used to freeze up on tests when I was in high school. I'd usually know the answer, but I never could write it down so well.

Instructor: Even though you knew the answer, it just didn't come through on the tests.

OR

And the teachers judged what you knew from what you wrote on the tests.

Mr. Sims: Yeah, the teachers didn't think I knew much, but I knew a lot more than showed up on the tests. Tests just scare the hell out of me. I really want to do this thing but, in a way, I wonder why I should spend my money when I know the tests are going to do me in. (pause) But I could do the repair work. I know I could! And I really want to go into that line of work.

Instructor: You're really scared about the chance of flunking out on the written tests, but you want to take the course so you can get into the repair business.

OR

It's a real dilemma: The thought of the tests is frightening, but you really want to get the hurdle over with so you can go into the business.

Mr. Sims: Yeah, I guess I do want it a lot. Maybe I'll just have to give it a try, and if it doesn't work out, well, at least I've tried.

Instructor: So you're inclined to try it, even though it might not work out, because it's important to you.

OR

It sounds like you're leaning toward giving it a try in spite of the tests because it's so important to you.

Mr. Sims: Yes, it really does mean a lot to me. This is the only way I can get into the business, so I guess I'd better just go ahead and see what happens. And I'll hope for the best on the tests.

Instructor: You're still anxious about the tests, but you want it so much, it's worth the try.

OR

You think it might be worth the risk to take the course because you want so much to go into the business, and you know you'd be good at it.

Mr. Sims: Yes, it really is that important to me. If I don't take the course, I'll never get where I want to be. I guess I'll just have to try super hard when it comes to the tests.

Instructor: Well, I guess you're determined to give it a try. If I can be of any help to you, just let me know.